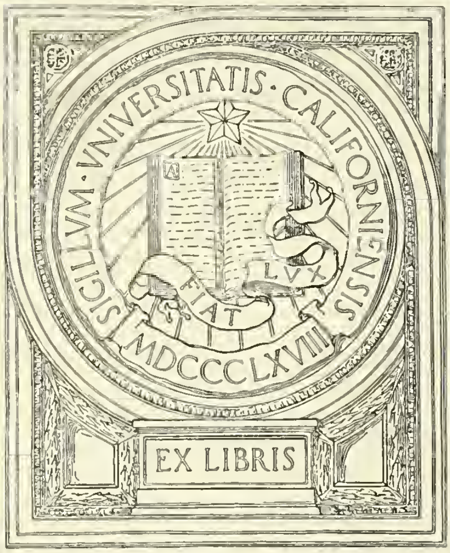
MEDICAL SCHOOL
LIBRARY



SIGILLVM · VNIVERSITATIS · CALIFORNIENSIS
FIAT LVX
MDCCCLXVIII
EX LIBRIS

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine, and Minneapolis Surgical Society

UNIV OF CALIF
MEDICAL SCHOOL

Owned and Published by
The Minnesota State Medical Association
Under the Direction of Its

EDITING AND PUBLISHING COMMITTEE

T. A. Peppard, M.D., Minneapolis
C. B. Wright, Minneapolis
J. T. Christison, M.D., St. Paul
E. M. Hammes, M.D., St. Paul
Waltman Walters, M.D., Rochester

EDITOR
Carl B. Drake, M.D., St. Paul

ASSISTANT EDITORS
W. F. Braasch, M.D., Rochester
C. A. McKinlay, M.D., Minneapolis

ASSOCIATE EDITORS

First District
Roy Andrews, M.D., Mankato
Second District
F. M. Manson, M.D., Worthington
Third District
Geo. B. Weiser, M.D., New Ulm
Fourth District
H. B. Aitkens, M.D., Le Center
Fifth District
F. U. Davis, M.D., Faribault
Sixth District
E. L. Gardner, M.D., Minneapolis
Seventh District
Paul Kenyon, M.D., Wadena
Eighth District
O. E. Locken, M.D., Crookston
Ninth District
E. L. Tuohy, M.D., Duluth

VOLUME 18

JANUARY TO DECEMBER, 1935

EDITORIAL AND BUSINESS OFFICES
2642 University Avenue - - - - - - - - Saint Paul, Minn.
BUSINESS MANAGER
J. R. Bruce

Digitized by the Internet Archive
in 2016

https://archive.org/details/minnesotamedicin18unse

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society.

Volume 18 JANUARY, 1935 Number 1

TREATMENT OF PELVIC INFLAMMATION BY HEAT: INDICATIONS AND RESULTS*

LAWRENCE M. RANDALL, M.D., *and* VIRGIL S. COUNSELLER, M.D.

Rochester, Minnesota

THE opinion of most physicians who are actively engaged in treatment of infections of the genital tract of women is that conservative medical measures take precedence, as a rule, over surgical treatment, for the desire is to conserve tissue and tissue-function. Surgical measures are to be used to drain collections of pus and to treat those women whose condition conservative treatment has failed to cure. Broadly speaking, three primary features are concerned with conservative treatment: time, rest, and heat. Sufficient time must be allowed for the individual to respond to treatment. Rest is essential, and the importance of it is not, in general, sufficiently appreciated. If these two conditions cannot be controlled, results from treatment are often unsatisfactory.

Concern here is with the third factor, heat, and the most effective method of its application. It has been demonstrated that heat, properly and sufficiently applied to the genital tract of women who are suffering from pelvic inflammatory disease, definitely increases the temperature of the pelvic viscera, thereby increasing the blood supply, causing local leukocytosis. Numerous methods have been used to accomplish this, and the most recent and efficient we believe to be the method developed by Elliott. This consists of a supply of water, under controlled pressure and temperature, that circulates through a specially shaped, elastic rubber applicator which is placed in the vagina. The pressure is regulated to distend the vagina, flattening the rugæ, and pressing against the cervix and fornices of the vagina, thus allowing the maximal amount of contact with the viscera to be treated. The pressure necessary to accomplish this will vary with each patient and perhaps with different treatments in the same case. Palpation of the amount of distention of the bag in the vagina is a better index of necessary pressure than the reading on the pressure gauge of the treatment machine. Given a sufficiently distended bag, that amount of heat is applied which can be tolerated at that pressure. This will be found to average about 125° F.

Our usual practice in administering a course of treatments is to make an application of fifteen to thirty minutes on the first day, thirty minutes on the second day, forty-five to sixty minutes on the third day, and to continue thereafter with a treatment of one hour's duration once or twice a day. At the beginning of any given treatment the temperature of the water should be between 110° and 115° F. The temperature is raised in the course of ten to fifteen minutes to the maximal tolerance of the patient. The average patient is able to tolerate a temperature of between 125° and 130° F. for an hour, under pressure of one pound to a pound and a half. There are individual variations, however, so that the maximal pressure and temperature will need to be determined for each patient. The applicator is inserted, completely empty of water, folded, and lubricated with any lubricating jelly. The rubber tube leading to the bag is covered with several layers of wet gauze to avoid irritation at the introitus. It is preferable, after the bag has been inserted and filled, to examine either through the rectum or through the vagina, to be sure that the

---

*From the Section on Obstetrics and Gynecology and the Division of Surgery, The Mayo Clinic, Rochester, Minnesota. Read before the Minnesota State Medical Association, Duluth, Minnesota, July 18, 1934.

36254

TABLE I. GONORRHEAL SALPINGO-OÖPHORITIS: 20 CASES

Type	Results		
	Excellent	Good	Unsatisfactory or incomplete
Subacute	7	1	0
Chronic	3*	4	5†
Total	10	5	5

---

*One patient underwent bilateral salpingectomy.
†Three patients received incomplete treatment.

Average number of treatments	18
Greatest number of treatments	39
Least number of treatments	9

TABLE II. CHRONIC SALPINGO-OÖPHORITIS OF UNKNOWN ETIOLOGY: ELLIOTT TREATMENT ONLY (67 CASES)

Type	Results		
	Excellent	Good	Unsatisfactory or incomplete
Chronic with exacerbation	0	12	4
Chronic	2	31	18*
Total	2	43	22

---

*Four incomplete.

Average number of treatments	15
Greatest number of treatments	27
Least number of treatments	6

bag is in its proper position. It is our policy to inspect the vaginal mucosa occasionally after treatment in order to be sure that injury is not being done to it, although, in our experience, there has been no instance of significant injury.

The patient should be examined at regular intervals, usually intervals of one week, to determine the response to treatment. As improvement occurs the subjective symptoms of pain and tenderness usually disappear first, to be followed later by reduction in size of the pelvic masses. Naturally, the amount of treatment needed by different patients will vary considerably. Improvement continues after treatment has been discontinued, so that it is usually preferable to treat a patient for two or three weeks, and then to allow an interval to elapse, after which the patient should be re-examined and the need for further treatment determined. If at this time any residual symptoms, or persistence of symptoms is noted, another course of treatment may be given and a period of time again allowed to elapse. It frequently will be noted, at the end of the interval between observations, that improvement in the condition of the pelvis has continued. Hence, it is not always possible to determine immediately after a course of treatment what the amount of benefit is to be.

We are presenting the results of treatment of 125 women who had pelvic inflammatory disease, and have excluded all cases in which this diagnosis could not be definitely established. These 125 patients have been divided into three groups, in accordance with the condition from which they suffered: (1) gonorrheal salpingo-oöphoritis (Table I), (2) chronic salpingo-oöphoritis of unknown etiology (Tables II and III), and (3) parametritis or chronic pelvic cellulitis (Table IV). This grouping seems desirable because of the difference in response to treatment demonstrated by patients who suffered from the various conditions. Included in the present study, also, are the end-results of treatment of some patients who were subjected to surgical measures, as well as to treatment by heat.

The results of treatment have been graded as excellent, good or satisfactory, and unsatisfactory or incomplete (Fig. 1). Results were considered excellent only in those cases in which the patient made no more complaint referable to the pelvis, and all evidence of the inflammatory condition, as determined by examination of the pelvis, disappeared. The results were graded as good or satisfactory in those cases in which pelvic symptoms were relieved, but in which pelvic examination revealed some residual scarring in the pelvis. The group in which results were designated unsatisfactory or incomplete was composed of cases in which there was persistence of pelvic disease and of pelvic symptoms. In some of the cases in the last group, patients had been advised to undergo surgical treatment, but had refused; in other cases we did not feel that a sufficient length of time or a sufficient number of treatments had been given, and in the remaining cases, regardless of the number of treatments, we were not satisfied with the results, as far as treatment by heat was concerned.

In thirty-seven cases (29.6 per cent of the entire group) results were excellent. Seventeen (45.9 per cent) of the thirty-seven patients were

TABLE III. CHRONIC SALPINGO-OÖPHORITIS OF UNKNOWN ETIOLOGY: ELLIOTT TREATMENT AND SURGICAL TREATMENT (23 CASES)

Type	Results		
	Excellent	Good	Unsatisfactory or incomplete
Chronic with exacerbation	6	0	0
Chronic	16	1	0
Total	22	1	0

Preoperative and postoperative Elliott treatment, 5 patients
Preoperative Elliott treatment only, 10 patients
Postoperative Elliott treatment only, 15 patients

TABLE IV. CHRONIC PELVIC CELLULITIS: RESULTS OF TREATMENT (15 CASES)

Results	Cases
Excellent	3*
Good	6
Unsatisfactory or incomplete	5

*One patient underwent subtotal hysterectomy.

treated surgically, in addition to receiving the Elliott treatments. In fifty-five cases (44 per cent of the entire group) results were classified as good or satisfactory. Four (7.2 per cent of the fifty-five patients) were treated surgically. In the majority of the fifty-five cases the condition was of considerable duration, and in many cases there had been repeated exacerbations. In thirty-three cases (26.4 per cent of the entire group) results were classified as unsatisfactory or incomplete. Four patients (12.1 per cent of this group of thirty-three) received surgical treatment. Of these four patients, one had tuberculous salpingitis; one, chronic tubo-ovarian abscess that was drained vaginally; one, an inflammatory cyst with extensive peritoneal exudate, and one, chronic parametritis. In fourteen of this group of thirty-three cases in which unsatisfactory or incomplete results were obtained, operation had been performed previously, and in an additional group of seven patients treatment was felt to be incomplete.

Thus, the complete program of treatment produced satisfactory results in ninety-two, or 73.6 per cent of all the cases. Twenty-one (22.8 per cent) of the ninety-two patients received surgical treatment in addition to application of heat; hence, 77.2 per cent of the satisfactory results may be attributed to conservative measures.

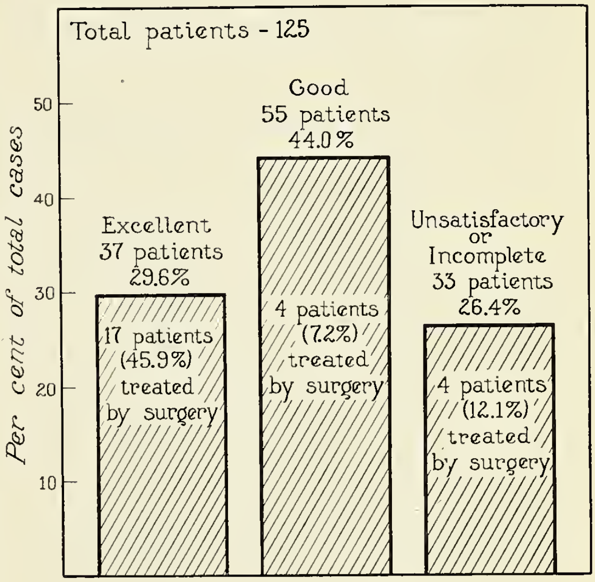


Fig. 1. Results of treatment.

Twenty-one of the 125 patients had rather extensive cervicitis. As is commonly seen associated with this condition, there was considerable tenderness of the sacro-uterine ligaments and of the bases of the broad ligaments, because of the associated lymphangitis. Following treatments with heat the uterine ligaments were less tender, and tended to return to their normal consistency. The local condition of the cervix was benefited so that in only five of the twenty-one cases was subsequent treatment by cautery deemed necessary. This is not a large enough group of patients with cervicitis on which to base a final opinion, but it would seem that patients who have extensive cervicitis, and who are in the child-bearing age, should derive considerable benefit from this form of treatment by heat, and that subsequent treatment would be less radical than it is in those cases in which heat is not used. We do not believe that this form of treatment should supplant treatment by cautery, applied in the office, for cervical ectropion or for moderate degrees of chronic cystic cervicitis.

The response of gonorrheal salpingitis and of gonorrheal cervicitis has been very good.

Gonorrheal infection of the urethra, however, has not yielded to application of heat to the vagina, so that the usual anti-gonorrheal treatment for urethritis has been employed in conjunction. We have also, in some cases, treated the cervix following the Elliott treatment by means of tampons soaked in 2 per cent protargol or 10 per cent argyrol.

Our experience, as reported here, deals largely with those chronic infections for which surgical treatment is more commonly advised, and for which conservative measures most often fail. The method of treatment by heat, here described, has in our opinion been responsible for improvement in the majority of cases, to the extent that surgical interference was not necessary to return the patient to normal activity. Examination of the pelvis of a patient who has had a chronic infection frequently reveals some residual thickening and scarring. Inasmuch as the symptoms are relieved and the patient is able to return to activity it seems fair to call this a satisfactory result. In those cases in which surgical treatment was deemed necessary, the use of heat before operation has led, in most instances, to a technically easier and less radical operation. In addition, treatment by heat applied through the vagina, during the postoperative period, has led to smoother postoperative convalescence, and to absorption of residual exudate in the pelvis.

The more recent the infection the better the prospect for complete cure. Our experience in acute conditions was chiefly limited to cases of gonorrheal salpingitis, and the results in these cases were excellent. We have seen too few patients with acute postabortal infections, in which this form of treatment has been used, to justify us in making a statement. Holden has given treatment in many such cases, and has reported striking reduction in morbidity and mortality.

Of the thirty-three cases in which we obtained unsatisfactory results, in fourteen operation had been performed previously. This suggests that other factors than the infectious process itself may be concerned with the production of pelvic symptoms. It is not infrequently found, at a second operation performed on patients of this type, that loops of small bowel are adherent to the pelvic viscera. Likewise, extensive adhesions often have bound the uterus in retroversion sufficient to produce symptoms which we cannot hope to relieve by conservative means. It is therefore too much to hope that any means of treatment by heat will cure all of the patients who have chronic pelvic inflammatory disease. We believe, however, that application of heat by the method devised by Elliott will simplify and increase the efficiency of conservative treatment of this condition. The general rules of treatment of this condition, however, remain essentially the same; namely, that time, rest, and heat, and intelligent use of surgical measures are fundamental.

HEMORRHAGE IN OBSTETRICS*

R. T. LA VAKE, M. D.

Minneapolis

HEMORRHAGE is the primary cause of approximately 17 per cent of obstetric deaths. It enters as a contributing factor in about one in twenty deaths from other puerperal causes. Next to sepsis, it is the most frequent cause of postpartum morbidity. The consideration of hemorrhage involves the examination of abortion, ectopic pregnancy, premature separation of the placenta, placenta previa, postpartum hemorrhage, and rupture of the uterus.

Abortion

Death from hemorrhage in abortion can be prevented in practically every case if women are instructed to report any vaginal bleeding immediately in pregnancy, if they follow out this instruction, and if we then place them under conditions that make the treatment of inevitable abortion safe as regards facilities for sterile packing when indicated, or curettage when indicated in afebrile cases, and as regards facilities for intravenous saline and blood transfusion. These facts are well known and yet approximately 8 per cent of abortion deaths are still due to hemorrhage.

---

*Read before the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

As 75 per cent of abortion deaths are due to, sepsis, vaginal interference of any kind is to be avoided where possible. If, without a question of doubt, normal pregnancy has been diagnosed before the advent of bleeding no examination may be necessary. Where doubt exists, or a differential diagnosis must be made because the patient has not been examined before, the rectal examination will suffice in most instances and we run no risk of introducing infection.

Approximately one in every four or five maternal deaths is due to abortion, criminal or otherwise. This menacing toll of abortion deaths appears to be largely due to a disturbing increase in loose thinking on the part of an increasing number of people, and to misinformation as to the safety of abortion even under the most perfect conditions. It is not confined to the unmarried, but is the cause of many motherless families.

Ectopic Pregnancy

Ectopic pregnancy is the cause of approximately 6 per cent of maternal deaths. Among these deaths about 60 per cent are directly due to hemorrhage. Experience shows that three out of every four of these deaths have been directly attributable to the following preventable causes: failure of the patient to present for examination as soon as she suspects that she may be pregnant; failure to report vaginal bleeding or abdominal pain of any kind in early pregnancy; failure of the physician to suspect ectopic pregnancy in the presence of spotting or definite bleeding or abdominal pain with or without fainting in early pregnancy; or, when suspecting ectopic pregnancy, failure in securing consultation when in doubt; and failing to place the patient under conditions that would have made quick operative intervention plus intravenous saline and blood transfusion possible.

Let me cite one case. A woman, married only three weeks, went shopping with her husband at three o'clock one afternoon. She suddently fainted in the store. When she recovered consciousness, she complained of abdominal pain and was taken home immediately and a physician called. The physician saw her at four o'clock. She gave a history of not having skipped a period. There was no vaginal bleeding, but she was very pale, had a rapid pulse and was exquisitely tender to vaginal and abdominal palpation. He administered aromatic spirits of ammonia for her feeling of faintness, diagnosed the condition as a fainting attack and left the house at five o'clock when she said she felt better. At ten p. m., five hours later, he called a consultant, explained his findings and treatment and said that though she had seemed to improve up to nine o'clock, at that time she had had another fainting attack and seemed markedly worse than when he had first seen her. The consultant rushed her to a hospital immediately, where she died before anything could be done.

Since 1920, at the Minneapolis General Hospital, 147 women have been operated upon for ectopic pregnancy. In these cases a history of a peculiar menstrual period, spotting, abdominal pain with or without fainting had antedated their entrance to the hospital from one to forty days. Over one-half of these women were admitted to the hospital after rupture had occurred. Where possible all were typed and cross matched immediately upon suspicion of ectopic pregnancy, and, in cases of hemorrhage, received blood transfusion as soon as the bleeding point had been ligated.

Suspicion of ectopic pregnancy should mean to us all, hospitalization, immediate typing and cross matching with quickly available donors, consultation where possible and immediate operation when the diagnosis of ectopic pregnancy has been made.

Placenta Previa and Premature Separation of the Placenta

About one in every twenty obstetric deaths is due to hemorrhage consequent upon one or other of these two conditions, placenta previa predominating two to one.

In the third trimester of pregnancy, uterine bleeding without pain should instantly suggest the likelihood of placenta previa, and uterine bleeding with pain should suggest the possibility of premature separation of the placenta, as should abdominal pain with a boardlike uterus. These patients, no matter how slight the symptoms, should be placed promptly under conditions making possible constant supervision and immediate intervention if necessary. They should all be typed and cross matched with quickly available donors. Diagnosis should be made by abdominal and rectal examinations alone in order that if cesarean section is deemed the operation of choice no infection can have been introduced by vaginal examinations.

Morbidity and mortality from these conditions can be reduced only by teaching the public to report bleeding and abdominal pain immediately, by the most conscientious watching of the patient from the advent of the earliest symptoms, by adequate consultation and correct decision as to the diagnosis and the safest method of conducting each individual case, and by preparation for blood transfusion.

In incomplete varieties of placenta previa, when intervention is deemed indicated, if the head is engaged, rupture the membranes and see if the head will tampon the placenta. If the head does not tampon the placenta and stop the bleeding, or if the head is not engaged, introduce the largest sized Voorhees bag possible and keep it taut against the placenta with a one pound weight. The patient should not be left for a moment, so that, when the bag pulls through, if bleeding starts again one can do a quick version and tampon the placenta with the buttocks. If there is sufficient dilatation of the cervix to do a Braxton Hicks version in the first instance, when the head is not engaged, many prefer this maneuver to the use of bags. However, those well versed in the use of bags feel that the chances of getting a live baby are greatly increased if one tampons the placenta and dilates the cervix completely with a bag introduced extraovularly followed by quick version, if necessary for hemorrhage, when the bag comes through. Whatever type of intervention one uses, after its performance, let labor take its course and do not hurriedly deliver by forceful means. Use this time for getting the patient back to good condition by the use of intravenous saline or blood transfusion if and as indicated by the pulse rate and volume and by the blood pressure. After delivery pack the uterus and vagina thoroughly with sterile gauze and leave the packing in for twenty-four hours. Many women are lost from failure to pack the uterus, with resulting postpartum hemorrhage. Where the previa is obviously a lateral variety, and the third stage is perfectly normal and followed by a normal amount of lochia, the packing may be omitted.

For central placenta previa, cesarean section is the operation of choice if no vaginal examinations have been made and no signs of infection are present. Here success depends not only upon strict observations of contraindications but upon ability to choose the best type of section and technical ability after the type is chosen. The Maternal Mortality Report of New York city for the years 1930, 1931 and 1932, showed that one-fifth of all obstetrical deaths, outside of deaths from abortion and ectopic pregnancies, followed cesarean section. This shows that this operation must be chosen with great caution no matter what the indication.

In premature separation of the placenta, where intervention is indicated, bring about dilatation of the cervix as quickly as possible by the use of bags followed by version or forceps if and as indicated. In some cases cesarean section is clearly demanded, to be followed by hysterectomy if a uteroplacental apoplexy of Couvelaire is found to be present.

Postpartum Hemorrhage

Deaths from postpartum hemorrhage approximately equal in frequency the combined deaths from placenta previa and premature separation of the placenta. This subject is very important because it may follow any labor and should be clearly envisaged in every labor and constant endeavor made to avoid it. Postpartum hemorrhage has the following causes: relaxation of the uterus from pure fatigue and shock consequent upon a long hard labor; relaxation of the uterus due to profound anesthesia; failure to minimize the blood loss in the third stage of labor; retained placental remnants; and laceration of the cervix due to operative deliveries through an undilated cervix.

The first requisite is prophylaxis. Make labor as painless as is safely possible. Provide supporting, easily assimilable food and sufficient fluid intake during labor. In long labors assure plenty of rest and sleep. When these measures are carried out, patients usually reach actual delivery in excellent condition. Take great care in reducing blood loss to a minimum in the third stage of labor. Immediately after the birth of the child have the nurse place her hand above the uterus and give warning of any ballooning of the uterus. This is especially indicated when deep anesthesia obtains. No matter what one's usual custom as to the use of pituitrin following the second stage of labor, it is the opinion of many of us that it should be used, without fail, directly after the birth of the child in long tiring labors and after deep anesthesia. Express the placenta as soon as it has separated. See that the uterus is not forced down in the pelvis. If it is, raise it out the pelvis by pressing upward and backward with fingers immediately above the symphysis pubis. Give the patient 1 c.c. each of pituitrin and sterile ergot by hypo. The uterus should be held for one hour after the delivery of the placenta. After delivery of the placenta see that it is intact and that the lochia is normal in amount after any required repair, before sterile drapes are removed. If bleeding is not normal and will not respond to pituitrin, ergot and holding of the uterus, we should explore the uterus, pack if necessary or repair a bleeding cervix. If one will never attempt to dilate a cervix rapidly or deliver through an undilated cervix he will likely never encounter a cervical hemorrhage. Whatever has been done or needs to be done, start administration of fluids promptly when patients show signs of effects from blood loss, but do not cease your work until the source of the bleeding is found and stopped.

Women should have the uterus held for one hour following delivery of the placenta and should be watched carefully for six hours. They should not be left if the lochia is not normal, the uterus is not firm and the pulse is increasing in frequency. No matter how small the blood loss, falling blood pressure and increasing pulse rapidity should direct the replacement of body fluids by Murphy drip, intravenous saline or blood transfusion as indicated by the severity of symptoms.

Rupture of the Uterus

Whenever rupture of the uterus is suspected after delivery, the uterus should be explored manually and, if rupture is found, immediate laparotomy is indicated, with every method to counteract the effect of shock and hemorrhage. Rupture of the uterus is a very rare condition where the labor or delivery has not been strikingly mismanaged. It is generally consequent upon ill-advised and ill-managed operative procedures, such as version and breach extraction, or after long and tempestuous labors due to failure to recognize disproportion between the passenger and the passage.

In discussing statistics of obstetric mortality due to all conditions, it has always been a matter of great interest to try to determine approximately what might be considered an irreducible minimum. Many men who have never suffered an obstetric mortality in their practice of many years, begin to wonder if all obstetric deaths are not preventable. Since our last meeting, the remarkable reports of study made by the United States Children's Bureau, of maternal mortality in fifteen states, and by the New York Academy of Medicine, of Maternal Mortality in New York city for the years 1930, 1931 and 1932, have been published and have thrown great light on this question. In the New York investigation, while every circumstance surrounding a case was fresh and available for investigation, the case was inspected and weighed from every angle by a committee of outstanding specialists and placed under the headings: preventable or not preventable. Of the 2,040 deaths, 65.8 per cent were considered preventable. An irreducible minimum of 34.2 per cent was determined. In the 65.8 per cent of preventable deaths, responsibility for the death was placed upon the attendant in 63.3 per cent and upon the patient in 36.7 per cent.

The conclusions of this committee as regards the causes of these preventable deaths are most instructive and we will quote them for the benefit of those who have not obtained a copy of the report.

> "First of all, it is evident that prenatal care was inadequate and improper. The patients repeatedly failed to seek prenatal care. Often if they did, it was very late in pregnancy and return visits were neglected."
>
> "It was plain that this arose out of ignorance and misinformation still widespread among the lay public in spite of the persistent efforts which have been made to combat it. It was apparent that women did not know the necessity for prenatal care and failed to understand just what constitutes proper prenatal care.' Many patients were ignorant of the gravity of certain apparently mild symptoms which indicated the presence of serious abnormalities. Persistent vomiting was disregarded, repeated vaginal hemorrhage neglected, pain and bleeding early in pregnancy and the milder symptoms of toxemia overlooked."
>
> "Many patients did attempt to obtain prenatal care. They consulted their physician early and returned regularly. But the attendant failed to give proper care. Physical examination was careless and incomplete.

Contractions of the pelvis were overlooked. The severity of complications was repeatedly underestimated and they were improperly treated."

"The high incidence of operative interference during labor was an important factor in the result. More than 45 per cent of the deaths in this series, exclusive of abortion and ectopic gestation, followed operative deliveries, and the death rate per 1,000 live births for operative deliveries was greatly in excess of that for spontaneous deliveries."

"Frequently the operation chosen was the wrong one. Often it was undertaken at an improper time. Manifestly obstructed labors were allowed to continue when it should have been clear that delivery could not be effected from below. Trial labors were frequently too greatly prolonged."

"Special mention must be made of the situation in regard to cesarean section. Many sections were undertaken for improper indications. Many were done after long, exhausting labors. The classical type was repeatedly performed without due regard to the fact that the patient, after a long labor, when membranes had been ruptured and repeated vaginal examinations had been made, was potentially infected. There were many operations performed after previous attempts at instrumental delivery had failed. Frequently these attempts and the final operation were the result of the incapacity of the accoucheur properly to judge the patient's ability to deliver herself. Often the type of operation was one which demanded greater training and skill than the attendant could command."

"The incapacity of the attendants, either in judgment or skill, contributed significantly to the large number of deaths. Their failure to provide proper prenatal care has already been pointed out. The prognosis of delivery was frequently incorrect. Labor was often improperly conducted. The physicians many times were apparently ignorant of the indications and contraindications for interference. Operative procedures were undertaken when there was no indication or a plain contraindication. Labor was terminated by a rapid traumatizing delivery when noninterference was called for. Operative procedures were performed on potentially infected patients. Attendants were tardy in obtaining proper consultations. There was failure to treat severe complications with all the means which should have been available. Difficult obstetrical operations were performed by physicians whose training and experience could not be considered adequate. At times the conclusion that proper asepsis had not been maintained could not be avoided."

"Hospital standards were inadequate in many instances. The actual physical equipment was inadequate in some hospitals. Proper facilities for labor and delivery were lacking. Isolation was not always carried out promptly. In some proprietary hospitals, the operating room was also used as the delivery room."

"Finally, midwife practice entered in as a contributory cause of the high rate. The training of these women was frequently insufficient."

This report shows that we must redouble our efforts to reduce preventable maternal mortality. Let us continue in every way to impress upon the public the danger of abortion, and the importance of early and continued prenatal care. Let us seek, as an association, to increase the time allotted to obstetrics in undergraduate training, and then impress upon our graduates that the undergraduate training is only an introduction to the practice of obstetrics and that if they intend to handle other than normal cases they should take postgraduate work. Let us encourage all men specializing in obstetrics, who fulfill the requirements, to take the examinations of the American Board of Obstetrics and Gynecology and receive its certificate; and let us continuously teach the public what this certificate of proficiency means, so that in the future women will tend more and more to go to the young man with special training rather than to the young physician who is using obstetrics purely as a means of livelihood until he can afford to give it up, at which time, in many instances, he has become a very competent obstetrician and his experience is then lost to the profession and to the community and a new insufficiently trained man takes his place. This is a fault in the present day mechanics of obstetric practice in this country that to my mind accounts for much mortality and morbidity.

Again we will never advance, and will likely retrogress, unless we choose more carefully our teachers, specialists, and prophets. Nature has been practicing advanced scientific medicine on man for hundreds of thousands of years and then along comes a man who decides that nature seldom knows when to bring on labor and advocates the frequent induction of labor; another advocates the elimination of the third stage of labor by manual removal of the placenta; another would eliminate the second stage of labor by version or forceps and another takes the palm by eliminating all three stages of labor by cesarean section, in many instances for no rational indication. It has come to the point when every medical student should have explained to him the deep significance of the note in medical magazines that reads: "The Editor accepts no responsibility for the views and statements of authors as published in these communications." Some of these articles are, to my mind, just as sensible and just as dangerous as would be an aviation article that would persuade pilots that because one man flew safely with passengers one hundred times between two points by blind flying in a very dark and densely foggy night, that that is an indication, even when an emergency does not exist, that blind flying is more safe for the average pilot than visual flying on a clear day. The great majority of our medical writings are sound and safe and not misleading, but some of them are actually dangerous in my opinion, and if they had to appear in a journal of which I were editor, I would print my editor's note about responsibility in red ink.

The time has come when, if we are going to progress in maternal mortality reduction in this country, we must either go back to European methods, the midwife or nurse midwife system combined with European conservatism in specialistic philosophy as regards intervention; or do what to my mind is better, and that is teach our graduate not having had special training in obstetrics but whose education is far greater than that of midwives, and who thus should be able to recognize abnormalities more promptly than midwives, teach them, I say, to call in trained attendants immediately on suspicion of abnormality, as well trained midwives are in the habit of doing. If they will not follow this teaching, the nurse midwife system is more safe, as comparative results compel one to admit. However, we will yet fail to get results unless our specialists are really well trained and teach and practice greater conservatism based upon a more philosophical respect for the wisdom of nature; and yet a conservatism of the type that has best been defined as "knowing when to be radical."

Summary

Improvement in maternal mortality statistics from hemorrhage can be made only by a more widespread conviction of the necessity for early examination and meticulous prenatal care throughout pregnancy, together with immediate and continuous oversight of the patient after the first sign of bleeding, under hospital surroundings that allow of prompt and adequate intervention, according to indications, with the greatest assurance of safety; by more frequent consultations, and by more frequent use of blood transfusion.

If one will analyze any large number of what appears to have been preventable deaths from hemorrhage, attributable to the attendants, one will see the necessity for increasing the time devoted to obstetric diagnosis in undergraduate training, that abnormality may be diagnosed early; the necessity for postgraduate training for those caring for abnormal cases; and, last, but not least, the teaching and practice of conservative obstetrics to prevent hemorrhage brought about by uncalled-for operative intervention.

ROENTGENOLOGIC DIAGNOSIS OF PLACENTA PREVIA*

WALTER H. UDE, M.D.
Assistant Professor of Roentgenology., University of Minnesota
and
JOHN A. URNER, M.D., Ph.D.,
Associate Professor of Gynecology and Obstetrics, University of Minnesota
Minneapolis

IT IS now somewhat more than two years since we first became aware of the fact that we could demonstrate placenta previa roentgenologically without direct invasion of the uterus. Since that time we have studied a total of about thirty-five patients who came to us in the third trimester of pregnancy with abnormal uterine bleeding. Fourteen of these showed roentgenologic findings of placenta previa. In all of the thirty-five cases the roentgenological findings were corroborated by the clinical and, in some cases, by the operative findings. In the cases of placenta previa, the clinical diagnosis was usually made independently by careful recto-abdominal examination, but the patients were submitted to roentgenologic studies to definitely confirm the diagnosis as an aid in determining the advisability of surgical intervention. We have found that under careful study the roentgenologic diagnosis can be made with a very high degree of accuracy, and that, if this agrees with the clinical findings, it practically establishes an absolute diagnosis of the condition.

---

*From the Departments of Roentgenology and Obstetrics and Gynecology, Minneapolis General Hospital and University of Minnesota. Presented before the Minnesota Radiological Society at the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

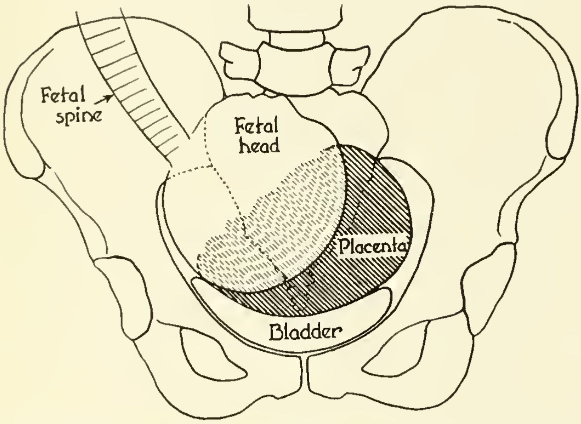


Fig. 1. Diagram of roentgenologic findings in placenta previa, showing the relationship of the placental mass to the urinary bladder and to the fetal head. (Previously published in *American Journal of Roentgenology and Radium Therapy.*)

Menees, Miller and Holly[2] described their method of roentgenological demonstration of the placenta in 1930. They injected a solution of strontium iodide through the anterior abdominal wall directly into the amniotic cavity, thus changing the amniotic fluid into a contrast material in which the placenta and the soft tissues of the fetus were demonstrated as filling defects. This method, however, appears to be associated with considerable danger to the fetus, and may result in premature delivery. Kerr and Mackay[1] modified this method by substituting a derivative of iopax for the strontium iodide. They found their solution non-toxic and non-irritating, but the injection had a great tendency to terminate the pregnancy. More recently Snow and Powell[3] have shown the outline of the placenta in normal implantation in the upper segment of the uterus, and have demonstrated that in many cases the normally implanted placenta can thus be shown without injection of contrast material into the amniotic fluid. Their report stated that they had not had occasion to apply this study to placenta previa. Our preliminary report[4] of the roentgenological demonstration of placenta previa without contrast material was based on the visualization of a soft tissue mass in the lesser pelvis of a pregnant woman, who presented herself for examination in the third trimester of pregnancy with a history of profuse bleeding from the uterus. A clinical diagnosis of placenta previa was made from the history and physical findings. A flat roentgenogram of the abdomen revealed a soft tissue mass in the lesser pelvis which distinctly separated the fetal head from the slightly filled urinary bladder, and which one of us (Ude) considered to be the placenta in the lower uterine segment. The findings in this case are illustrated in Figure 1. A cesarean section was done by Weum, with delivery of a premature living fetus, and with demonstration of implantation of the placenta in the lower uterine segment completely covering the cervical os.

Following the observation of this first case, we attempted to establish the normal relationship of the pregnant uterus and the fetus to the pelvic structures, especially to the urinary bladder, and to evaluate as diagnostic features the abnormalities described in our first case[4]. As mentioned above, our studies have shown this to be a very accurate method of confirming the presence of placenta previa.

Roentgenologic Technic

Since the identification of a placental mass in the lower uterine segment depends, to a large extent, on an accurate definition of the adjacent structures, we inject a small quantity, not more than forty cubic centimeters, of sodium iodide or other contrast solution into the urinary bladder, after removal of the urine by catheterization. The catheter is then withdrawn. We can thus clearly define the upper margin of the bladder. The roentgenogram is then made with a large sized film, but with the central ray directed vertically over the lower abdomen. The use of a Bucky diaphragm with fast technic is necessary.

Anatomic Relations and Roentgenologic Diagnosis

The body of the uterus normally rests against the upper posterior side of the urinary bladder, and this relationship persists with pregnancy, the intestinal loops and omentum being displaced superiorly and posteriorly. A thin fold of peritoneum dips down between the lower uterine segment and the wall of the bladder. With the fetal head down in the lower uterine segment, the normal soft-tissue space between the cranial bones of the fetus and the contrast material in the bladder consists of the thin scalp of the fetus, the wall of the lower uterine segment measuring only a few millimeters in diameter, the fold of peritoneum and the relatively thin wall of the bladder. The total diameter of these structures scarcely exceeds one centimeter, and usually the film study reveals it as a narrow band of tissue between the two land-marks. If, however, placenta previa is present, this space is considerably wider than normal, and usually the outline of the placental mass can be defined. Figure 2 illustrates the typical positive findings in one of our recent cases. From this it is self-evident that the head of the fetus must present in the lower uterine segment to make it possible to establish these facts. In a case of transverse position we were unable to apply this method satisfactorily, but it is possible that in breech presentation the outline of the breech may give us a sufficiently clear definition of the upper margin of the placental mass. To this date our experience does not include any cases of placenta previa with breech presentation.

The size and position of the placental mass in the lower uterine segment, together with the nature of the displacement of the fetal head, give us sufficient information to express an opinion whether we are dealing with a central or a partial type of placenta previa. The presence of blood clots, or the presentation of a foot or hand, may confuse the picture, and such possibilities must be carefully considered. However, if the observations have been carefully made, and if they are corroborated by all of the clinical and physical findings, the diagnosis may be made with a very high degree of accuracy, and surgical procedures may be carried out without the least uncertainty as to the nature of the existing condition.

Summary and Conclusions

1. The technical and diagnostic features of the roentgenologic diagnosis of placenta previa are again briefly described.

2. We have now applied this method in more than thirty-five cases of pregnancy which were complicated during the third trimester by abnormal hemorrhage. In addition to this we have made comparable studies on a number of control cases in order to establish the normal findings.

3. We have found this method of diagnosis very satisfactory, allowing a definite conclusion to be reached without invasion of the uterus and without contamination of the genital tract.

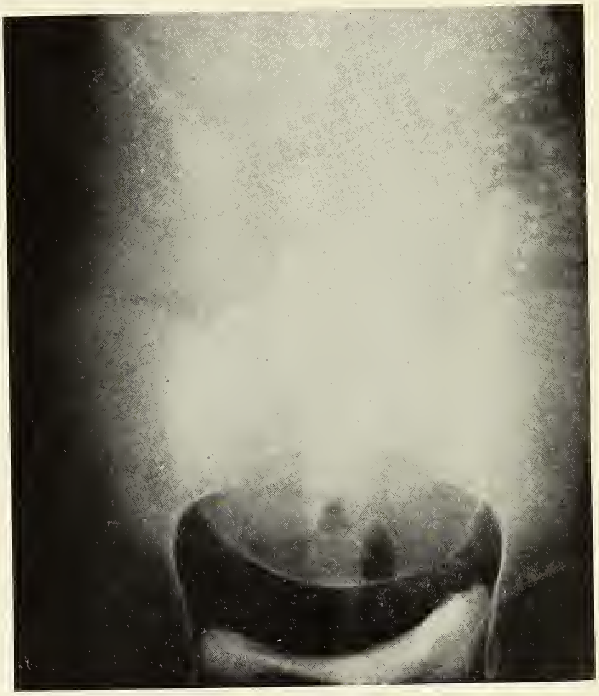


Fig. 2. Cystogram showing soft tissue mass between the fetal head and the bladder, characteristic of placenta previa of the central type. Proven by cesarean section. Findings are similar to those shown in Figure 1.

4. We urgently advise that clinical and roentgenologic findings should be in agreement before the diagnosis is regarded as final.

802 MEDICAL ARTS BUILDING.

References

1. Kerr, J. M. M., and Mackay, W. G.: The diagnosis of placenta previa, with special reference to employment of x-rays for this purpose. Jr. Edinburgh Obst. Soc., pp. 21-32, 1932-33, Edinburgh Med. Jour., March, 1933.
2. Menees, T. O., Miller, J. D., and Holly, L. E.: Amniography; preliminary report. Am. Jour. Roentgenol. and Radium Therap., 24:363-366, 1930.
3. Snow, William, and Powell, Clilian B.: Roentgen visualization of the placenta. Am. Jour. Roentgenol. and Radium Therap., 31:37-40, 1934.
4. Ude, W. H., Weum, T. W., and Urner, J. A.: Roentgenologic diagnosis of placenta previa. Am. Jour. Roentgenol. and Radium Therap., 31:230-233, 1934.

MENOPAUSAL AND POST-MENOPAUSAL BLEEDING

H. M. N. WYNNE, M.D.
Minneapolis

IRREGULARITIES of bleeding from the genital tract are of importance during the entire life of woman and are of especial significance about the time of and after the menopause. Carcinoma of the cervix occurs most commonly between the ages of thirty and sixty, the greatest incidence being between thirty-five and forty-five, according to Kelly's experience, while Gates and Warren find the greatest incidence between forty and sixty. Johnson and Tyrone in a series of 926 cases found 35.4 per cent between the ages of forty and fifty. Strachan noted that 54 per cent of a series of 300 cases occurred in the post-menopausal period. Strachan quotes three series showing that 29 per cent of 500, 40 per cent of 500 and 72 per cent of 800 occurred in women over fifty years of age. Women under forty are less inclined to neglect irregular bleeding than those nearing the menopause. Physicians as well as patients have been known to ascribe such bleeding to "the change of life" in lieu of undertaking an investigation of the real cause.

Early diagnosis is of paramount importance and will be obtained only when neither patient nor physician courts delay. The cause of the bleeding may be organic or functional. If organic, a diagnosis of a benign or malignant nature must be determined promptly. In order of frequency, primary carcinoma of the cervix, corpus, ovaries, vulva, vagina and tubes occurs. Sarcoma, chorioepithelioma, teratoma, melanoma and endothelioma are relatively infrequent. Metastases in the genital tract may occasionally be the first sign of a malignant growth primary in other organs, such as are found with Krukenberg tumors and with the vaginal metastases from certain nephromas. Invasion of the genital tract by malignant tumors of the rectum and bladder usually occurs after the location of the primary growth has been determined.

Benign organic lesions are most frequently myomata or fibromata, certain ovarian cysts, mucous polyps or inflammatory lesions of the genital organs. Before the menopause it is also necessary to keep in mind incomplete abortions, extrauterine pregnancies and hydatid form moles. Functional bleeding is probably most often due to endocrine dysfunction, but this diagnosis should be made only after proper investigation. Blood dyscrasias, syphilis or focal infections are sometimes the etiological factors.

Diagnosis is of the utmost importance and should be made promptly. A careful history and a painstaking examination should never be neglected. The old dictum, "A finger in the rectum and a catheter in the bladder," may save embarrassment later. Painting the cervix with Lugol's solution as advocated by Schiller may be an aid. The examination is not complete unless a biopsy of any suspicious area on the cervix and a curettage are done, all tissue removed being sectioned and examined by a competent pathologist. If such an examination is made and no cause for the bleeding is found we should keep the patient under observation while focal infections and constitutional diseases are being treated. Organic lesions should be ruled out before attempting endocrine therapy.

Kanter and Klawans reported a study of ninety-eight consecutive cases of post-menopausal bleeding from the records of the Presbyterian Hospital and the Cook County Hospital of Chicago. In this series 68.4 per cent were malignant and 31.6 per cent benign. They conclude that there is no apparent relationship between the type or amount of bleeding and the seriousness of the existing condition, and that parity, length of time in the menopause and duration of active menstrual life are of no particular value as diagnostic aids.

Fahmy of Edinburgh has published an analysis of 937 cases of post-menopausal bleeding from series of cases reported by seven different observers and of the total 180 were taken from private records and 757 from the records of hospital clinics in Edinburgh and Glasgow. In this large number he found 43.12 per cent malignant and 56.88 per cent benign.

While any small series of cases may be misleading from a statistical point of view, certain lessons of practical value may be drawn from them. With this in mind I have taken a series of records of my private patients all over forty years of age, and have divided it in three groups: pre-menopausal, menopausal and post-menopausal.

In the first group there had been no definite symptoms such as are usual during the menopause. The ages ranged from forty to fifty-five years. The average age was forty-five years. Each of the second group had had some symptoms of the menopause such as hot flashes, periods of amenorrhea or diminished flow. In this group the ages were from forty to fifty-five years. The average age was forty-seven. The post-menopausal group was selected on the basis used by Fahmy, *i.e.*, at least six months amenorrhea before the irregular bleeding had begun. The ages of this group were forty to seventy-five years and the average 57.6 years. The menopause is a gradual physiological process and therefore it is difficult in some cases to be sure that an individual record is placed in the correct group but I believe that the classification used by Fahmy will give a fair estimate. In my experience the majority of women living in this climate cease menstruating between the ages of forty-five and fifty, but there are a considerable number who have had their menopause before forty-five and a larger number who continue to menstruate regularly after fifty.

In this series I have listed only cases in which pathological examination of organs removed at operation, curettings, biopsies or postmortem findings were available and an occasional case in which diagnostic curettage was refused but the patient observed for a period of three or more years after the cessation of irregular bleeding and was found normal. The heading "Benign, cause undetermined," includes all cases in which a pathological diagnosis of normal endometrium, hypertrophy or hyperplasia of endometrium, senile or atrophic endometrium, was made and no other lesion found to account for the bleeding. Such cases are probably of endocrine origin. There was more than one possible cause of bleeding in several instances.

All types of bleeding are included, whether bloody discharge, spotting, continuous or interrupted bleeding of any degree of severity. In the pre-menstrual group we also included severe menorrhagia. Many of these patients had more or less severe secondary anemia. I have seen one patient, aged thirty-two in whom severe menorrhagia was the only symptom of a cancer of the corpus. The history of irregular bleeding is frequently brought out only after careful questioning. One woman came to me complaining of a lump in the breast which she feared might be cancer. A careful history revealed the fact that she had had continuous vaginal bleeding for a year which she thought was "the change of life." She had a cyst in the breast and a cervical carcinoma 6 cm. in diameter. In two instances the patients complained of genital bleeding which proved to be due to urethral lesions. I have not included any case in which the complaint was of blood in the urine. One woman complained of rectal hemorrhages and occasional vaginal bleeding, the cause being a large carcinoma of the rectum and a cervical polyp which was probably benign. In my experience bleeding has not

TABLE I

Diagnosis	Pre-Menopausal	Menopausal	Post-Menopausal	Type of Bleeding in Post-Menopausal Cases			
				Bloody Discharge	Spotting	Moderate	Profuse
Carcinoma cervix	4	0	5	0	4	1	0
Carcinoma corpus	1	0	6	1	0	2	3
Carcinoma tubes	0	0	1	0	1	0	0
Carcinoma ovaries	2	0	0	0	0	0	0
Carcinoma pelvis							
Probably ovarian	0	0	1	0	1	0	0
Probably uterine	0	0	1	0	1	0	0
Vaginitis senile	0	0	8	6	2	0	0
Vaginitis trichomonas	0	0	5	5	0	0	0
Vaginitis ulcer (pessary)	0	0	1	0	1	0	0
Prolapse uterus (ulcers)	0	0	5	0	5	0	0
Granulation tissue, vaginal vault, post-operative	0	0	2	0	2	0	0
Cervical polyps	5	9	12	4	6	2	0
Cervical erosion	0	1	0	0	0	0	0
Uterine polyps	5	2	2	0	2	0	0
Myoma	27	10	4	0	4	0	0
Adenomyoma	1	0	0	0	0	0	0
Chronic P.I.D.	0	0	1	0	0	1	0
Chocolate cysts (ovaries)	0	1	1	0	0	1	0
Fibrosis uteri	5	0	0	0	0	0	0
Tubal pregnancy	2	0	0	0	0	0	0
Incomplete abortion	4	0	0	0	0	0	0
Ovarian cyst	1	0	0	0	0	0	0
Prolapse urethra	0	0	1	0	1	0	0
Urethral caruncle	0	0	1	0	1	0	0
Urethral polyps	0	0	1	0	1	0	0
Benign (diagnosis undetermined)	9	16	13	1	6	5	1
Totals	66	39	71	17	38	12	4

TABLE II

(From Kanter and Klawans)	Type of Bleeding				
	Number	Discharge	Spotting	Moderate	Profuse
Cancer cervix	51	2	16	17	16
Cancer corpus	11	0	4	1	6
Cancer vagina	1	0	1	0	0
Cancer vulva	2	0	0	1	1
Cancer ovary	1	0	0	1	0
Zona granulosa	1	0	0	1	0
Senile vaginitis	3	0	3	0	0
Urethral caruncle	2	0	1	1	0
Fibromyoma	7	0	4	0	3
Cervical erosion	3	0	3	0	0
Prolapse	5	1	2	1	1
Cervical polyp	8	1	3	4	0
Vaginal ulcer	1	0	1	0	0
Fibrosis uteri	2	0	0	1	1
Total	98	4	38	28	28

Menopause 30–57.
Majority 45–51

TABLE III

	(From Fahmy)	Number of cases	Percentage
1.	Carcinoma of cervix uteri	241	25.72
2.	(?) Ovarian dysfunction, diagnosis doubtful	141	15.05
3.	Polypus: mucus and fibro-adenomatous	114	12.17
4.	Carcinoma of corpus uteri	93	9.82
5.	Prolapse: genital (with or without friction ulceration)	86	9.17
6.	Fibromyoma and fibroid polypus: uterine	64	6.83
7.	Cervicitis and vaginitis	40	4.27
8.	Ovarian neoplasm: malignant	32	3.52
9.	Caruncle of urethra	27	2.88
10.	Senile endometritis	20	2.13
	Ovarian neoplasm: benign	20	2.13
11.	Carcinoma of vagina	12	1.28
	Vaginal ulceration due to pessary	12	1.28
12.	Carcinoma of vulva (labium)	10	1.07
13.	Sarcoma of uterus, corpus, fibroid and retroperitoneal	8	0.85
14.	Carcinoma of clitoris	3	0.32
15.	Carcinoma of urethra	2	0.21
	Tuberculous endometritis	2	0.21
	Prolapse of urethra	2	0.21
	Myxo-fibroma of vagina	2	0.21
	Hyperpiesis (constitutional, e. g. cirrhosis of liver)		20.21
16.	Sarcoma in cervical stump	1	0.11
	Carcinoma of peritoneum (secondary to breast tumor)	1	0.11
	Malignant papilloma of bladder	1	0.11
	Tuberculous granuloma of urethra	1	0.11
	Total	937	99.98

been present in a large percentage of ovarian malignancies.

Kanter and Klawans state, "All cases of post-menopausal bleeding should be considered malignancies until proved otherwise," and in this dictum we agree. I doubt if their series will give a fair cross section of the percentages of benign and malignant lesions in an ordinary gynecological practice. All hospital clinics equipped to treat cancer should show a larger percentage of cancer patients than would be found in the average group of women who consult some physician for bleeding after the menopause. However, in any such group the number of malignant lesions found is large enough to make the diagnosis of "benign or malignant" a serious responsibility.

Table I summarizes the types of lesions causing abnormal bleeding in the three groups. The types of bleeding in our post-menopausal cases are also shown in this table. Comparing this table with tables from Kanter and Klawans it is found that their conclusions are supported by this series. Fahmy's conclusions in respect to the importance of the type of bleeding also agree with these findings.

In my small series 19.7 per cent were malignant and 80.3 per cent benign. In one case a carcinoma occurred in the cervical stump following a hysterectomy done by another surgeon ten years before. I performed a diagnostic curettage and a biopsy of the cervix in another case two and a half years before the patient returned with a carcinoma of the cervix. The cervical tissue removed was examined by a competent pathologist. The two patients with bleeding from granulation tissue in the vault of the vagina had been operated upon in another city some weeks before. The ages of the two patients who had tubal pregnancy were forty and forty-one, and incomplete abortions were present in women of forty, forty-two, forty-three, and forty-nine years. In neither case of chocolate cysts of the ovaries were we able to demonstrate endometrial tissue.

Conclusions

Post-menopausal bleeding should be considered to be due to a malignant lesion until careful investigation has proven otherwise.

There are many benign lesions that cause postmenopausal bleeding but any irregular bleeding should be investigated promptly.

If after thorough examination the cause of bleeding has not been discovered the patient should be kept under close observation for several years.

References

Fahmy: J. Obst. & Gynec. Brit. Emp., 40:506, 1933.
Gates and Warren: Surg., Gynec. & Obst., 58:962, 1934.
Johnson and Tyrone: Surg., Gynec. & Obst., 58:113, 1934.
Kanter and Klawans: J. Obst. & Gynec., 24:192, 1932.
Kelly: Gynecology, D. Appleton and Co., 572, 1928.
Strachan: J. Obst. & Gynec. Brit. Emp., 40:460, 1933.
Wynne: Journal-Lancet, N. S., 52:280, 1931.

ESSENTIAL THROMBOCYTOPENIC PURPURA*

CARL O. KOHLBRY, M.D.
Duluth

THROMBOCYTOPENIC purpura, or purpura hemorrhagica, was first separated as a distinct entity from other types of bleeding by Werlhof in 1771-75. It has frequently been spoken of as Werlhof's disease.[3]

Purpura as a whole may be divided into two types: (1) the thrombocytopenic, in which there is a deficiency of platelets, and (2) the non-thrombocytopenic.

Non-thrombocytopenic purpuras[6] show no deficiency in the clotting power of the blood. The cause of bleeding is usually a dysfunction of the capillaries due to injury to the individual cells thereof or their binding substances. Allergic purpuras such as Schoenlein's and Henoch's types fall into this group. The bleeding which occurs in scurvy is another familiar example.

Thrombocytopenic purpura can be subdivided into two groups: the symptomatic, and the essential. The symptomatic types of purpura include all cases in which the platelet deficiency is merely an indication of a severe generalized recognizable condition. Greenwald and Sherman[4] classify four different groups of symptomatic thrombocytopenic purpura according to etiology: (1) thrombocytopenia following dyscrasia of the blood (leukemia, pernicious anemia, aplastic anemia, and agranulocytosis); (2) thrombocytopenia accompanying acute infection (typhus, general sepsis); (3) thrombocytopenia accompanying poisoning with organic chemicals (benzol or arsenic compounds); (4) thrombocytopenia subsequent to destruction of the bone marrow by ganulation tissue (Hodgkin's disease, Gaucher's disease).

These types of purpura are mentioned in passing merely to differentiate them from the essential type with which this paper deals.

Essential thrombocytopenic purpura is characterized by the absence of any known disease which can be held responsible for the deficiency of platelets. The hemorrhages which occur in this disease vary greatly as to site and amount. They may be extremely severe and intractable, leading to death within a few days, or mild but protracted with long periods of remission.

Cases of essential thrombocytopenic purpura occur most frequently before the third decade. An analysis of ninety cases by Whipple[3] showed 81 per cent occurring before the age of forty. It is a not uncommon disease of children. Females are more commonly affected than males.[9] The patient is usually of normal health until symptoms of bleeding occur. Bleeding may occur from any site. Purpura, that is, bleeding into the skin itself, is not a necessary symptom. It, however, is very apt to be present, resulting especially from mild trauma. It may vary from generalized petechiæ to larger ecchymoses. Bleeding from the nose is perhaps most common. Other frequent sites are the gingival margins and the kidneys. Cerebral bleeding occurs occasionally. Multiple sites of bleeding commonly occur.

There are few symptoms other than the bleeding. The resultant anemia depends upon the severity and duration of the hemorrhages. The spleen may or may not be enlarged. In about one-half the cases it will be found of normal size.[10] Enlargement of the spleen is not significant in prognosis.[8]

---

*Read before the Northwestern Pediatric Society in connection with the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

The diagnosis of essential thrombocytopenic purpura rests upon the following blood findings: (1) increased bleeding time; (2) decreased platelet count; (3) non-retractability of the clot; and (4) increased capillary permeability as determined by the capillary resistance test.

Increase in bleeding time is characteristic of this disease. A normal bleeding time (Duke's method) is considered to be from one to three and one-half minutes. In this type of purpura bleeding times varying from ten minutes to several hours are not infrequent. In thirty-five cases collected from the literature by Stewart[10] an average bleeding time of twenty-five minutes was obtained. The increase in bleeding time does not necessarily parallel a decrease in platelets. Jones and Tocantins[5] are of the opinion that the bleeding time is the best available index in determining the course of the disease.

The coagulation time is usually within normal limits. Such limits are two to seven minutes (capillary tube method).

Normally the platelet count is usually found to fall between 250,000 and 500,000 per cubic millimeter. The platelet count is always decreased in this disease. When it falls below 100,000 there is usually active bleeding. Figures as low as 10,000 per cubic millimeter have been reported. The number of platelets does not necessarily determine the tendency to hemorrhage. Hemorrhagic phenomena have been reported when the platelet count is relatively high; on the contrary counts of less than 100,000 have been observed without hemorrhage. Changes in the quality of the platelets themselves have been mentioned. Kugelmass[6] describes means of platelet study, including tests for platelet fragility.

Normally blood allowed to stand in a test tube will clot so that there is complete retraction of the clot with squeezing out of the serum in twenty-four hours. Retraction of the clot is usually delayed or even absent in this disease. This phenomenon is believed to be associated with the platelet deficiency, that is, the platelets are considered responsible for the retraction of the clot and expression of the serum.

Capillary hyperpermeability or weakness is essential for hemorrhage to occur. It is another important factor in this disease. The condition of the capillaries can be ascertained by the capillary resistance test (Rumpell-Leeds test). A blood pressure cuff is applied to the arm at mean blood pressure for five minutes. If, within a few minutes after removal of the cuff, purpuric spots appear on the arm below it, the test is considered positive. The occurrence of purpuric spots measuring one centimeter or more in diameter is almost pathognomonic of thrombocytopenic purpura.

With the exception of the above-mentioned findings the blood picture as a general rule is fairly normal. The amount of secondary anemia depends upon the severity of the hemorrhage. Evidence of blood regeneration with increase of reticulocytes is usually found. The fragility of the red cells is normal.

Pathologically there are few findings other than the hemorrhages and resultant evidence of anemia. Of the seven spleens removed in McLean, Kreidel and Caffey's series[8] none showed specific diagnostic changes. Other authors have noted perisplenitis and increased fibrosis. In the spleen of DeSanctis and Allen's case[3] there were what were considered to be proliferated endothelial cells. Many cells of the reticulum contained engulfed platelets and a diagnosis of hyperplasia of the splenic pulp was made. Coster[13] pointed out evidences of increased phagocytosis of platelets by endothelial cells, of increased permeability of the capillary walls, and of dysfunction in the formation of platelets. One of the hazardous features of this disease has been the occasional intracranial hemorrhage.

In the discussion of etiology it would seem wise to first recall the mechanism involved in blood clotting. This matter is still confused. However, the classic theory of the present in its simplest form has been stated by Cooley[1] as follows:

> "It is quite generally agreed that there are present in the circulating blood, prothrombin, calcium, fibrinogen, and possibly a small amount of the liquid cephalin, and that the fluidity of this mixture is maintained by something for which we use the term antithrombin. When the blood is shed, changes take place which are probably started by disintegration of the platelets. We see that they contain cephalin, probably an additional amount of prothrombin, and therefore add these to the shed blood as compared to the circulating blood. As soon as the blood is shed, the platelets become agglutinated, and undergo disintegration with the libera-

tion of cephalin, which in the presence of calcium, probably serving as a catalyst, converts prothrombin to thrombin. The thrombin and fibrinogen in turn unite to form fibrin, which is deposited as a network of fine needles, enmeshing the corpuscles. Ultimately this mass of fibrin needles and corpuscles contract, producing the firm clot and extruding the serum."

LeSeurd and Pagniez[3] have shown that the platelets contain a retracting ferment which is liberated in the clotting process and is responsible for the contraction of the fibrin fibers which squeeze out the serum.

Diminution in number of the platelets has been stated to be a characteristic finding in this dissease. There is much discussion as to how this is brought about. One school of thought maintains that there is an abnormal destruction of the platelets by the cells of the reticulo-endothelial system, most notably in the spleen, while the other as staunchly believes that the spleen elaborates a myelo-toxin which inhibits normal production of the platelets by the megakaryocytes of the bone marrow. Kugelmass[6] feels that the site of the disease is primarily in the spleen, where there is destruction of the platelets, and secondarily in the bone marrow, where platelet formation is interfered with. The decided improvement which follows splenectomy, especially in chronic cases, points to the spleen as the main culprit. Some of the failures after splenectomy, however, may be due to exhaustion of the megakaryocytes in the bone marrow. Splenectomy also may fail because of the fact that other portions of the reticulo-endothelial system are as much at fault as the spleen and continue their destructive action even after its removal.

The platelets, as noted above, are indispensable factors in blood clotting. Deficiency in their number is the commonest cause of pathological hemorrhage.[6] The platelet content of the blood is closely related to the length of the bleeding time as well as to the retractability of the clot. Bedson[2] believes that in addition to decrease in platelet count one must have injury to the capillary walls; in other words, that purpura will not occur from platelet deficiency alone.

The primary cause of either essential thrombocytopenic purpura is likely an infection or a toxin which either affects the reticulo-endothelial system, especially in the spleen, or causes some abnormality of the bone marrow. The general impression seems to be that the platelets are destroyed by an overactive reticulo-endothelial system with its main focus in the spleen. Jones and Tocantins[5] believe that this condition is a deficiency disease occurring in a person with a so-called hemorrhagic constitution, the acute phase of which is precipitated by an infectious process or by other substances which affect capillary permeability.

Many authors believe that infection is responsible for the initiation of the series of changes which finally result in bleeding. Such infection may be acute or chronic, obvious or hidden. In McLean, Kreidel, and Caffey's series[8] twelve of the twenty-one cases reported had had recent definite infection. The delay in appearance of hemorrhagic evidences after these infections suggests to them the possibility that allergy may be a factor in the thrombocytopenia through affection of the megakaryocytes. Removal of infectious foci may in itself cure the disease. There is general agreement that such infectious foci should be cleared up, as they are known to predispose to continuation of the purpura or to cause recurrence of the disease even after splenectomy.

When we come to prognosis it must first be remembered that spontaneous recovery is by no means unusual. Eleven cases in a group of fifty-three reported by one author[5] fall into this category. Periods of freedom from hemorrhage are not uncommon and may last weeks or years. The prognosis varies with the individual case, depending upon its severity and response to treatment. In general, however, the tendency to recovery is good. There are some acute fulminating cases which go on to fatal outcome regardless of therapy.

Treatment.—Patients with this disease usually present themselves during the actively bleeding state. If bleeding is not controlled by simple measures, transfusion is the most effective remedy. In emergencies the intramuscular injection of fifty cubic centimeters of whole blood may suffice to arrest the hemorrhage.[6] Larger transfusions from a suitable donor, however, not only supply platelets but seem to stimulate platelet formation. Such transfusions may have to be repeated every four days, paralleling the average life of a platelet. In severe cases they may be necessary several times within twenty-four hours. Contemplated splenectomy is usually preceded by transfusion and a donor is kept at hand in order to repeat it after operation when necessary.

Most authors favor giving fairly large amounts of blood. Jones and Tocantins[5] advise a dosage of one hundred to three hundred cubic centimeters for children. Twenty-four of their fifty-three patients were tided over by this procedure so that splenectomy was avoided.

Even if the platelet count does not materially increase, transfusion may help to reduce the bleeding time. Sanford[1] has been successful with intraperitoneal blood injection; other authors have used it without success. The use of citrated blood usually gives good results. It should certainly be used when an emergency exists.

Bleeding as a rule does not cease until twenty-four hours or more after transfusion. One would expect, if the increase in platelets due to the injected blood were the vital factor in arresting hemorrhage, that it would stop immediately. As a matter of fact, however, the favorable effect of transfusion usually becomes manifest two to five days later.

As to other methods of control in the acute case, most authors deprecate the use of preparations directed towards the stimulation of clotting, such as thromboplastin. Cooley,[1] however, has stated that thromboplastin injections have been successful in his hands when transfusion has failed.

Injections of antivenin have been successful in several instances.[2,12] The serum prepared by the use of Bothrops Atrox Venin seems especially desirable. This snake, the South American Fer-de-lance, elaborates a venom which is far more apt to produce hemorrhage through a disturbance of capillary permeability than are the venoms of our North American poisonous snakes. The serum prepared through its animal injection should accordingly be more efficacious in arresting hemorrhage. It may be given subcutaneously in ten cubic centimeter dosage or even intravenously in fulminating cases. The usual care in the use of injections of any horse serum should be exercised.

Granted that transfusion has been successful in controlling the acute bleeding, further treatment is indicated. Kugelmass[6] believes that proper diet is of great service. A diet high in protein and fat seems to encourage clotting. The fat intake, particularly in the unsaturated lipids, appears to parallel the level of the platelets.[7]

Ultraviolet light therapy may be useful as an adjuvant as it is thought to stimulate platelet increase. Extra Vitamin D, as viosterol, is recommended by some. Liver feeding, in addition to improving the general hemopoietic activity, seems to increase the platelets.[1] Others recommend iron.[5] Roentgen therapy has been used. Calcium is useful in decreasing capillary permeability.[6] It may be given orally but action is more prompt when it is given intravenously as a 10 per cent solution of either the gluconate or chloride, ten to twenty-five cubic centimeters being injected slowly. Gelatine also tends to arrest bleeding.[6] It can be fed as a ten per cent solution or given in the same strength intravenously, twenty to forty cubic centimeters being injected at one time.

The elimination of foci of infection must be instituted during this period when active bleeding has been controlled. It will frequently result in a cure.

This brings us to the last important procedure in the control of this disease, namely, splenectomy.

The chief requisite for success in splenectomy is a correct diagnosis. Next in importance comes the choice of the proper time for operation. The spleen should be removed only in those patients who, in spite of adequate treatment by other means, have repeated recurrences of symptoms, or in those in whom symptoms are sufficiently severe to threaten life. Operation is far more successful in the chronic than in the acute case. One should therefore use all available methods to carry the patient over into the chronic stage if possible before instituting splenectomy. If this cannot be done operation is indicated even in the acute case. Good results can be expected in about 70 per cent of the cases if operation is performed during the chronic stage.

Payr[1] reported thirty-four cases in which ligation of the splenic artery was carried out. His results, though slower, were good. As there is less shock in this procedure it is less dangerous. Further trial of this method may prove it very valuable.

Results of splenectomy are often dramatic. Hemorrhage may cease almost at once. The platelet count rapidly rises within twenty-four hours to levels as high as a million per cubic millimeter. It subsequently falls but usually remains in the higher ranges.[8]

Even in apparently properly selected cases failure may occur. As stated previously this may be due to the fact that the platelet deficiency is caused by faulty production in the bone marrow rather than by excessive destruction in the spleen; that there may still be present in the remaining reticulo-endothelial system a focus of platelet destruction capable of continuing the process; or that there is a supernumerary spleen.

Case Report

This patient, a boy, was first seen on January 10, 1925, when he was two years old. Examination showed him to be a normal child with the exception of a right inguinal hernia. During the following months he was seen several times because of a cold, and later a follicular tonsillitis with a complicating otitis media. In May, 1925, tonsillectomy was advised because the tonsils were hypertrophied and showed evident chronic infection. In October, 1925, five months later, he had his first evidence of bleeding, a nosebleed. This responded to cauterization of the septum. At this time the tonsils continued to be chronically infected but removal was not accomplished.

His next visit occurred in June, 1926, with another nosebleed. Examination revealed, in addition, numerous ecchymoses on his body. On questioning, his mother stated that the child bruised easily. By this time tonsillectomy was definitely agreed upon by the parents and he was hospitalized for a blood examination previous to operation. Laboratory study reported his hemoglobin 60 per cent, the red blood cells 3,650,000 and the white blood cells 10,000. The differential count was normal. The coagulation time was five minutes, the bleeding time eighteen minutes and the platelet count 150,000. The clot retraction test was poor. He was accordingly believed to be a case of thrombocytopenic purpura and sent home with appropriate instructions, including calcium by mouth, to prepare for tonsillectomy.

One month later (July 1926), he returned to the hospital. No improvement in his blood findings had occurred. Accordingly he was given a transfusion of 350 cubic centimeters of citrated blood intravenously. After transfusion his platelet count was 140,000 and his clot retraction test still weak but the bleeding and coagulation time were normal. Tonsillectomy was performed the following day. During operation he bled profusely but this was controlled by packing. No severe bleeding occurred postoperatively.

The following month (August 1926), he again reported with the history of six or seven nosebleeds during the interval. His body again showed scattered purpuric areas. The spleen was not palpable and had not been palpable previously. From this time until his entrance to the hospital in February 1927, a period of six months, he had only one nosebleed, which had occurred two weeks previously. On the day of his admission he had had a nosebleed lasting seven hours. Examination showed him decidedly pale, with active nasal hemorrhage and three or four scattered ecchymoses on the body. His hemoglobin was 30 per cent, red blood count 2,100,000, white blood count 7,000 and the differential blood count normal. The platelet count was 30,000 per cubic millimeter, the coagulation time three and one-half minutes, the bleeding time twelve minutes. There was very little clot retraction in twenty-four hours. His nose was packed and thromboplastin given, followed the next day by five hundred cubic centimeters of citrated blood intravenously. His general condition improved after transfusion but he continued to bleed from the nose. Accordingly he was given four cubic centimeters of ten per cent calcium chloride intravenously, following which the bleeding ceased and he was discharged.

He returned five days later because of recurrence of bleeding. Blood counts again showed a decided anemia but there were definite evidences of blood regeneration. His platelet count was 140,000, the clot retraction test poor, and the capillary resistance test positive. He was again given calcium chloride intravenously on two occasions, followed two days later by five hundred cubic centimeters of citrated blood intravenously. This improved his general condition but his nasal bleeding continued, accompanied by fresh crops of petechiæ on the body. On one occasion his spleen was palpated. Splenectomy was first considered. After discharge his nosebleeds and petechiæ continued but he made steady general improvement. Generalized ultraviolet treatments were used. In April 1927, one month later, an x-ray treatment was given over the spleen.

In July 1927, Dr. Isaac A. Abt demonstrated him before the annual State Medical meeting in Duluth, confirmed the diagnosis of essential thrombocytopenic purpura, and advised splenectomy. This, however, was not permitted by the parents. He was lost sight of for a year until August 1928, when he reported in fairly good condition. The parents stated that he continued to show ecchymoses off and on but that the nosebleeds were much less frequnt. His blood counts were practically normal, the bleeding time six minutes, and the platelet count 180,000. Again in July 1930, two years later, he reported doing well, bleeding occurring only after trauma.

I saw him again in May 1934, one month ago. His parents stated that he was doing very well. During this whole spring he has had only two very mild nosebleeds. He still has a tendency to bruise occasionally. Examination showed him to be in good general condition with no unusual findings. At this time his blood check-up showed the following: hemoglobin 75 per cent (Sahli), red blood count 4,600,000, white blood count 12,000, differential blood count normal. The platelet count was 310,000, coagulation time four minutes, bleeding time two minutes, capillary resistance test negative. After one hour his blood clot showed a slight margin of clear serum, after two hours a definite margin. Complete retraction of the clot occurred within fifteen hours, a normal figure.

Conclusions

1. A résumé of the recent literature of essential thrombocytopenic purpura is presented.

2. The history of such a case is appended. This case serves to illustrate the likely causal relationship of chronic infection, in this instance tonsillar. It also illustrates the known fact that some patients may be tided over the acute period of this disease by the aid of transfusion without recourse to splenectomy. This patient has shown only minimal bleeding in the past six years. He, therefore, is enjoying at least a long period of remission with an excellent prospect of ultimate cure.

References

1. Cooley, Thomas B., and Sanford, Heyworth N.: Round table conference on blood disorders, characterized by bleeding; Proceedings of the Third Annual Meeting of the American Academy of Pediatrics, Jour. Ped., 3:916-936, (December) 1933.
2. Dawson, Lord, of Penn: Indications for, and results of, removal of spleen. Brit. Med. Jour., 3745: 699-700, (Oct. 15) 1932.
3. DeSanctis, Adolph G., and Allen, Abbott William: Purpura hemorrhagica (thrombocytopenia). Am. Jour. Dis. Child., 41:552-567, (March) 1931.
4. Greenwald, Harry M., and Sherman, Irving: Congenital essential thrombocytopenia. Am. Jour. Dis. Child., 38:1245-1251, (December) 1929.
5. Jones, Harold W., and Tocantins, Leandro: The treatment of purpura hemorrhagica. Jour. Am. Med. Assn., 100:83-88, (January) 1933.
6. Kugelmass, I. Newton: The mechanism and management of hemorrhagic disturbances in infancy and childhood. New York State Jour. Med., 33: 434-447, (Apr. 1) 1933.
7. Kugelmass, I. Newton: The management of hemorrhagic problems in infancy and childhood. Jour. Am. Med. Assn., 99:895-902, (Sept. 10) 1932.
8. McLean, Stafford; Kreidel, Katherine, and Caffey, John: Hemorrhagic thrombocytopenia in childhood. Jour. Am. Med. Assn., 98:387-393, (Jan. 30) 1932.
9. Pemberton, John DeJ.: Results of splenectomy in splenic anemia, hemolytic jaundice and hemorrhagic purpura. Trans. Am. Surg. Assn., 49:346-356, 1931.
10. Stewart, Walter Blair: Splenectomy for hemorrhagic purpura of childhood. Jour. Med. Soc. New Jersey, 26:116-124, (February) 1929.
11. Stockton, Max R., and Franklin, George C. H.: Antivenin therapeusis in purpura. Jour. Am. Med. Assn., 96:677-678, (Feb. 28) 1932.
12. Taylor, K. P. A.: Antivenin in thrombocytopenic hemorrhage, importance of bothropic type. Am. Jour. Surg., 21:285-288, (August) 1933.
13. Washburn, Alfred Hamlin: Splenectomy in thrombopenic purpura; Jour. Am. Med. Assn., 94:313-317, (Feb. 1) 1930.

ELECTROCARDIOGRAPHY AS A DIAGNOSTIC ADJUNCT IN THE ANGINAL SYNDROME OF CORONARY SCLEROSIS*

FREDRICK A. WILLIUS, M.D.

(With the Technical Assistance of Margaret E. Elmer)

Rochester, Minnesota

TWO thousand cases, in which the diagnosis of the anginal syndrome associated with coronary sclerosis was made, form the basis of this study.

The term angina pectoris has come into very unorthodox usage, far removed from Heberden's original teaching, often being applied to the painful symptoms attending any or all forms of heart disease. In order to avert misunderstanding, I use the term anginal syndrome and modify its use by affixing its etiology, which in the present consideration is coronary sclerosis.

It is an acknowledged fact that, in approximately 25 per cent of the cases, the diagnosis of coronary sclerosis with the anginal syndrome rests solely on the subjective phenomena of the disease. Thus, under certain conditions in which, for various reasons, the patient may willfully refuse to acknowledge the occurrence of the syndrome, the examining physician may inadvertently be led to believe that the heart is normal, and so commit himself.

In a consideration of patients with coronary disease, it is essential to separate them into certain clinical groups for the reason that associated or consequent conditions may so alter the pathologic processes as completely to confuse the interpretation of the resulting electrocardiographic findings. For example, when the anginal syndrome forms the basis of selection of patients with coronary sclerosis, we at once become confronted with the fact that, in an appreciable number of cases, healed cardiac infarction consequent to coronary thrombosis occurs. This complication, even though it may be a relic, often results in the persistence of electrocardiographic abnormalities. The same is true of hypertension, which occurs in almost half the cases.

---

*From the Section on Cardiology, The Mayo Clinic, Rochester, Minnesota. Read before the Heart Association in connection with the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

The 2,000 cases that form the basis for this study were grouped as follows: Group 1, anginal syndrome in cases of healed cardiac infarction, 282 patients (14.1 per cent); Group 2, anginal syndrome in cases of hypertension, 915 patients (45.7 per cent); and Group 3, anginal syndrome in cases without cardiac infarction or hypertension, 803 patients (40.1 per cent).

The electrocardiogram always reveals abnormalities during the stage of acute cardiac infarction unless death occurs within the first few hours. It is of course necessary to obtain daily electrocardiograms in order to observe the transitional changes as they occur, and to permit their proper interpretation. Such observation also usually permits localization of the infarct. Complete healing of the infarct normally occurs in ninety days, and the electrocardiogram rarely returns to normal in less than six months or a year and remains permanently altered in about 25 per cent of the cases. A second factor may influence the electrocardiogram in cases in which cardiac infarction has healed, namely, cardiac hypertrophy. It has been clearly shown that cardiac hypertrophy may occur in cases of healed cardiac infarction, particularly when the infarct was large, and predominantly in cases in which multiple infarcts have occurred. A review of the electrocardiographic changes consequent to acute cardiac infarction is beyond the scope of this paper, but the residual abnormalities will be considered. It is well known that hypertrophy of the left ventricle consequent to hypertension produces electrocardiographic changes. Therefore, this influence must be judiciously appraised when the anginal syndrome accompanying coronary sclerosis is considered. The electrocardiogram frequently records hypertrophy of one ventricle or the other, as expressed by the predominant strain. Minor changes which often are not convincing are observed in left and right axis deviation but, when hypertrophy is well marked, T wave negativity occurs which is convincing evidence. For instance, in conditions that produce predominant strain on the left ventricle and its ultimate hypertrophy, T wave negativity in Lead I or Leads I and II frequently occurs. This is especially seen in cases of hypertension, of aortic stenosis and less frequently of aortic insufficiency.

In contradistinction to this status, conditions producing predominant strain on the right ventricle and its ultimate hypertrophy cause T wave negativity to occur in Leads II and III. This is prone to occur in diseases such as arteriosclerosis of the pulmonary artery, marked pulmonary emphysema or fibrosis, and at times in pure mitral stenosis.

The remainder of the patients (Group 3), who had neither cardiac infarction nor hypertension, are presumed to represent uncomplicated cases of coronary sclerosis. A possible error in the selection of this group must be acknowledged in that some patients may have experienced previous cardiac infarction which was not recognized at the time, and later, at the time of examination at the Clinic, the history of previous coronary thrombosis was not mentioned or was overlooked. It is also possible that, in some cases, hypertension had occurred but spontaneously became lowered to attain the range of accepted normal. These cases represent varying degrees of coronary sclerosis, some in which the arteries remain patent, others in which the tendency for obliteration of the lumen occurs, and in which the outstanding pathologic picture is myofibrosis.

The presentation of statistics dealing with electrocardiographic findings in a large series of cases becomes a difficult and an involved problem owing to the fact that the abnormalities encountered in a single case are frequently multiple. The presentation becomes further complicated by the necessity of dividing the material into the three clinical groups already described. Although complete analysis of the material is presented in Tables I to IV, for those who may be interested in the detailed computation, I will confine my remarks to the predominant findings based on their total values as they occur in the clinical groups.

The average duration of the anginal syndrome prior to examination at the clinic was two and eight-tenths years. Detailed data regarding duration cannot be considered now.

Table I

COMPARATIVE PERCENTAGE OF THE INCIDENCE OF ELECTROCARDIOGRAPHIC FINDINGS AMONG 2000 PATIENTS WITH THE ANGINAL SYNDROME OCCURRING IN CORONARY SCLEROSIS

Electrocardiographic findings	Total findings			One finding present			Multiple findings present														
							Incomplete bundle branch block			Complete heart block			Auricular fibrillation			Auricular flutter			Lengthened Q wave in lead III		
	Group			Group			Group			Group			Group			Group			Group		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
T wave negativity																					
Lead I	24.8	20.5	15.3	19.5	17.6	12.6	2.8	1.3	1.4			0.1	1.0	0.4	0.1		0.2	0.1	1.4	1.1	1.0
Leads I and II	6.7	10.5	4.6	5.0	7.8	3.2	0.7	0.5	0.7					0.8	0.2		0.1		1.1	1.3	0.4
Leads II and III	23.0	2.7	11.8	10.6	2.2	8.6	1.1	0.1	0.6				0.7		0.2				11.0	0.4	0.5
Leads I,II and III	5.0	2.6	3.6	3.5	2.2	2.5	0.4	0.3	0.5						0.2				1.1	0.1	0.4
Diphasic T waves																					
Lead I	3.9	9.6	3.7	3.5	8.1	2.5		0.8	0.6						0.1				0.4	0.8	0.5
Leads I and II	2.1	2.5	1.4	1.4	2.1	1.2	0.4		0.1					0.1					0.4	0.3	
Leads I,II and III	1.4	2.1	1.0	0.7	2.0	0.6	0.4	0.1	0.2										0.4		0.1
Conduction defecta																					
Complete bundle branch block	1.4	2.5	3.6	1.4	2.5	3.6															
Incomplete bundle branch block	7.8	5.5	5.2	2.1	2.0	1.0								0.3	0.1		0.1				
Delayed a-v conduction		0.1	0.2		0.1	0.2															
Complete heart block	0.4		0.1	0.4																	
Disturbances of rhythm																					
Auricular fibrillation	2.8	3.1	2.5	1.1	1.3	1.5											0.2				
Auricular flutter		0.7	0.1																		
Nodal tachycardia		0.1	0.1		0.1	0.1															
Miscellaneous																					
Lengthened Q wave in lead III	23.0	8.9	10.2	7.4	4.8	5.4							0.4								
Normal	20.6	38.0	46.1																		

Group 1: Anginal syndrome in cases in which cardiac infarction was healed.
Group 2: Anginal syndrome in cases in which there was hypertension.
Group 3: Anginal syndrome in cases in which cardiac infarction and hypertension were not present.

Table II

COMPARATIVE INCIDENCE OF THE ELECTROCARDIOGRAPHIC FINDINGS IN 282 PATIENTS (14.1 PER CENT) WITH THE ANGINAL SYNDROME AND HEALED CARDIAC INFARCTION. PERCENTAGE BASED ON TOTAL GROUP OF 2000 CASES

Electrocardiographic findings	Total findings		One finding present		Two findings present						More than two findings
					Incomplete bundle branch block		Auricular fibrillation		Lengthened Q wave in Lead III		
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	
T wave negativity											
Lead I	70	24.8	55	19.5	8	2.8	3	1.1	4	1.4	
Leads I and II	19	6.7	14	5.0	2	0.7			3	1.1	
Leads II and III	65	23.0	30	10.6	3	1.1	2	0.7	31	11.0	1 A
Leads I, II and III	14	5.0	10	3.5	1	0.4			3	1.1	
Diphasic T waves											
Lead I	11	3.9	10	3.5					1	0.4	
Leads I and II	6	2.1	4	1.4	1	0.4			1	0.4	
Leads I, II and III	4	1.4	2	0.7	1	0.4			1	0.4	
Conduction defects											
Complete bundle branch block	4	1.4	4	1.4							
Incomplete bundle branch block	22	7.8	6	2.1							
Delayed a-v conduction											
Complete heart block	1	0.4	1	0.4							
Disturbances of rhythm											
Auricular fibrillation	8	2.8	3	1.1							1 A
Auricular flutter											
Nodal tachycardia											
Miscellaneous											
Lengthened Q wave in lead III	65	23.0	21	7.4			1	0.4			1 A
Normal	58	20.6									

A: T wave negativity in leads II and III, auricular fibrillation, lengthened Q wave lead III.

Table III

COMPARATIVE INCIDENCE OF THE ELECTROCARDIOGRAPHIC FINDINGS IN 915 PATIENTS (45.8 PER CENT) WITH THE ANGINAL SYNDROME AND HYPERTENSION. PERCENTAGE BASED ON TOTAL GROUP OF 2000 CASES

Electrocardiographic findings	Total findings		One finding present		Two findings present								More than two findings
					Incomplete bundle branch block		Auricular fibrillation		Auricular flutter		Lengthened Q wave Lead III		
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	
T wave negativity													
Lead I	188	20.5	161	17.6	12	1.3	4	0.4	2	0.2	10	1.1	1 B
Leads I and II	96	10.5	71	7.8	5	0.5	7	0.8	1	0.1	12	1.3	
Leads II and III	25	2.7	20	2.2	1	0.1					4	0.4	
Leads I, II and III	24	2.6	20	2.2	3	0.3					1	0.1	
Diphasic T waves													
Lead I	88	9.6	74	8.1	7	0.8					7	0.8	
Leads I and II	23	2.5	19	2.1							3	0.3	
Leads I, II and III	19	2.1	18	2.0	1	0.1	1	0.1					
Conduction defects													
Complete bundle branch block	23	2.5	23	2.5									
Incomplete bundle branch block	50	5.5	18	2.0			3	0.3	1	0.1			1 B
Delayed a-v conduction	1	0.1	1	0.1									
Complete heart block													
Disturbances of rhythm													
Auricular fibrillation	28	3.1	12	1.3					2	0.2			1 B
Auricular flutter	6	0.7											
Nodal tachycardia	1	0.1	1	0.1									
Miscellaneous													
Lengthened Q wave in Lead III	81	8.9	44	4.8									
Normal	348	38.0											

B: T wave negativity in lead I, incomplete bundle branch block, auricular fibrillation

Table IV

COMPARATIVE INCIDENCE OF THE ELECTROCARDIOGRAPHIC FINDINGS IN 803 PATIENTS (40.1 PER CENT) WITH THE ANGINAL SYNDROME UNASSOCIATED WITH CARDIAC INFARCTION OR HYPERTENSION. PERCENTAGE BASED ON TOTAL GROUP OF 2000 CASES

Electrocardiographic findings	Total findings		One finding present		Two findings present										More than two findings
					Incomplete bundle branch block		Complete heart block		Auricular fibrillation		Auricular flutter		Lengthened Q wave Lead III		
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	
T wave negativity															
Lead I	123	15.3	101	12.6	11	1.4	1	0.1	1	0.1	1	0.1	8	1.0	
Leads I and II	37	4.6	26	3.2	6	0.7			2	0.2			3	0.4	
Leads II and III	95	11.8	69	8.6	5	0.6			2	0.2			20	2.5	1 C
Leads I,II and III	29	3.6	20	2.5	4	0.5			2	0.2			3	0.4	
Diphasic T waves															
Lead I	30	3.7	20	2.5	5	0.6			1	0.1			4	0.5	
Leads I and II	11	1.4	10	1.2	1	0.1									
Leads I,II and III	8	1.0	5	0.6	2	0.2							1	0.1	
Conduction defects															
Complete bundle branch block	29	3.6	29	3.6											
Incomplete bundle branch block	42	5.2	8	1.0					1	0.1					1 C
Delayed a-v conduction	2	0.2	2	0.2											
Complete heart block	1	0.1													
Disturbances of rhythm															
Auricular fibrillation	20	2.5	12	1.5											1 C
Auricular flutter	1	0.1													
Nodal tachycardia	1	0.1	1	0.1											
Miscellaneous															
Lengthened Q wave in lead III	82	10.2	43	5.4											
Normal	370	46.1													

C: T wave negativity in leads II and III, incomplete bundle branch block, auricular fibrillation.

Normal Electrocardiograms

I will first review the occurrence of normal electrocardiograms, as I believe that the proper appraisal of negative evidence in these cases is more important than the interpretation of obvious abnormalities. In my determination of what constitutes a normal electrocardiogram, I have disregarded the minor and variable alterations that may occur in normal hearts, such as ventricular preponderance, axis deviation, premature contractions, and variations in the contour of the P waves. I have also disregarded the notching and slurring of the QRS complexes in isolated leads, records that do not fulfill the requirements of bundle branch block.

Based on these criteria, the electrocardiograms in 34 per cent of 2,000 cases were normal. The lowest incidence of normal tracings was seen in fifty-eight (20.5 per cent) of the 282 cases of healed cardiac infarction of Group 1; the incidence was 348 cases (38.0 per cent) of the 915 cases of hypertension in Group 2, and the highest incidence, 370 cases (46.0 per cent) of the 803 uncomplicated cases of Group 3. Thus, although the electrocardiogram reveals significant abnormalities in the majority (66 per cent) of the cases, a normal tracing must never be the sole basis for excluding the existence of coronary disease.

T Wave Negativity

When T wave negativity occurs in Lead I, the statistical data in this study predominantly favor the existence of a healed infarct involving the anterior surface of the left ventricle, or the cardiac hypertrophy consequent to hypertension. The findings were seventy cases (24.8 per cent) in Group 1, 188 cases (20.5 per cent) in Group 2, and 123 cases (15.3 per cent) in Group 3. However, when T wave negativity occurs in Leads I and II, the chances predominantly favor the existence of cardiac hypertrophy consequent to hypertension. There were nineteen cases (6.7 per cent) in Group 1, ninety-six cases (10.5 per cent) in Group 2, and thirty-seven cases (4.6 per cent) in Group 3.

In cases of T wave negativity in Leads II and III the ratios become reversed. Chance predominantly favors the existence of a healed infarct involving the posterior basal portion of the left ventricle, and strongly militates against the effects of hypertension. The findings with these changes revealed an incidence of sixty-five cases (23.0 per cent) in Group 1, twenty-five cases (2.7 per cent) in Group 2, and ninety-five cases (11.8 per cent) in Group 3.

When T wave negativity occurs in all leads, chance predominantly favors the existence of healed infarction. There were fourteen cases (5.0 per cent) in Group 1, twenty-four cases (2.6 per cent) in Group 2, and twenty-nine cases (3.6 per cent) in Group 3.

Diphasic T Waves

Diphasic T waves are transitions between positive and negative waves, and represent either the stage before which negativity occurs or the transitional stage of recovery following negativity. Thus, the importance of their proper interpretation becomes apparent. I have excluded diphasic T waves in Leads II and III, as they are very prone to be transitory; at times they occur in normal hearts, are evidences of the waning effects of administration of digitalis, and their evaluation is uncertain. The incidence of diphasic T waves was distinctly less than the negative T waves, and their relative incidence in the various clinical groups differed somewhat from the others.

Diphasic T waves in Lead I occurred in eleven cases (3.9 per cent) in Group 1, in eighty-eight cases (9.6 per cent) in Group 2, and in thirty cases (3.7 per cent) in Group 3. When occurring in Leads I and II it was found that six cases (2.1 per cent) were recorded in Group 1, twenty-three cases (2.5 per cent) in Group 2, and eleven cases (1.4 per cent) in group 3.

The occurrence of diphasic T waves in all leads were distributed in the following manner: four cases (1.4 per cent) in Group 1, nineteen cases (2.1 per cent) in Group 2, and eight cases (0.1 per cent) in Group 3.

Conduction Defects

Electrocardiograms displaying complete bundle branch block are most striking abnormalities. The QRS interval is prolonged, usually ranging between 0.12 and 0.18 seconds, and results from retardation of the spread of the excitation through the interventricular septum. Thus, the QRS interval is influenced by the thickness of the septum, which is often markedly increased in greatly hypertrophied hearts. The amplitude of the QRS complexes is usually high, and their contour is deformed by notching and splintering which appears to result chiefly from lack of balance. The T wave is exaggerated, and its direction is opposite to that of the main deflection of the QRS group.

The greatest incidence of complete bundle branch block occurred in Group 3, in which there were twenty-nine cases (3.6 per cent). There were twenty-three cases (2.5 per cent) in Group 2, and only four cases (1.4 per cent) in Group 1. Thus, the occurrence of complete bundle branch block in cases of coronary sclerosis with the anginal syndrome in a ratio of 3:1 favors the existence of uncomplicated coronary sclerosis.

The electrocardiograms of incomplete bundle branch block comprise those displaying abnormalities transitional between normal complexes and those of complete bundle branch block. The amplitude of the QRS complexes rarely attains the height of those seen in complete bundle branch block. The QRS interval rarely exceeds 0.12 or 0.14 seconds, and the T waves do not bear a constant directional relationship to the QRS complexes.

The incidence of incomplete bundle branch block in this study does not parallel that of complete bundle branch block. The greatest incidence occurred in Group 1, in which there were twenty-two cases (7.8 per cent). There were fifty cases (5.4 per cent) in Group 2, and forty-two cases (5.2 per cent) in Group 3.

Delayed A-V conduction beyond 0.22 second occurred in only three cases of the entire group. There was one case (0.1 per cent) in Group 2, and two cases (0.2 per cent) in Group 3. We only look on this finding with significance when it persists after the subcutaneous administration of 1/100 grain (0.0006 gm.) of atropine sulphate. The delay in conduction disappearing after the administration of atropine is considered to be the result of vagal augmentation.

Complete heart block occurred rarely, only two cases being recorded. There was one case (0.4 per cent) in Group 1 and one (0.1 per cent) in Group 3.

Disturbances of Rhythm

It is well known that both auricular fibrillation and flutter may occur in any form of cardiopathy, yet experience has shown that they occur predominantly in mitral stenosis, hyperthyroidism and in cases of hypertension. Their occurrence in coronary disease is not outstanding.

Auricular fibrillation is characterized in the electrocardiogram by the absence of P waves, by total arrhythmia of the ventricular complexes, by a variation in the height of the R wave and often by the registration of the rapidly undulating fibrillary waves denoted as F. The absence of P waves is due to the fact that the auricles do not contract dynamically, but their walls are the seat of extremely rapid fibrillary activity. The irregularity of the ventricular components occurs owing to the fact that the discharge of auricular impulses is so rapid and incoördinate that only certain ones are transmitted through the A-V bundle.

Auricular fibrillation occurred with greatest frequency in Group 2, in twenty-eight cases (3.1 per cent). There were eight cases (2.8 per cent) in Group 1, and twenty cases (2.5 per cent) in Group 3.

The electrocardiogram of auricular flutter is striking. The most characteristic feature is the rapidity of the auricular waves, the P wave displaying a constant movement which results in a serrated graph. The individual P waves usually have a very angular appearance. In flutter the auricles contract very rapidly (200 each minute or more), so that impulse discharge occurs at a rate greater than the A-V bundle can transmit, and the ventricle responds to every second, third or fourth auricular impulse.

Auricular flutter and fibrillation are frequently alternating disorders of the same patient. There were six cases (0.7 per cent) of auricular flutter in Group 2 and only one case (0.1 per cent) in Group 3.

Nodal tachycardia, an ectopic rhythm originating in the auriculo-ventricular node, occurred only twice, in one case (0.1 per cent) in Group 2 and in one case (0.1 per cent) in Group 3.

Lengthened Q Wave in Lead III

During the last few years, considerable attention has been accorded to the lengthened Q wave in Lead III. Certain criteria for the consideration of this abnormality have been demanded, namely, electrocardiograms of left axis deviation, or normal axis deviation; the excursion of the Q wave in Lead III must exceed the greatest excursion of the QRS complex in any lead by 25 per cent; records with notching deformity of the QRS complex must be disregarded, and the

Q wave must be succeeded by a definite upward deflection (R) and no S wave.

When these criteria are strictly adhered to, one is impressed with the rare occurrence of this finding in what appears to be a normal heart. It occurs predominantly (90 per cent) in diseases that exert their influence on the left ventricle, such as hypertension and coronary sclerosis. The lengthened Q wave in Lead III is a common finding in coronary thrombosis when the infarct is situated in the basal posterior surface of the left ventricle. Its incidence in Group 1 verifies the foregoing statement; there were sixty-five cases (23.0 per cent) in Group 1, in contrast to eighty-one cases (8.9 per cent) in Group 2, and eighty-two cases (10.2 per cent) in Group 3.

Summary

The value and importance of the electrocardiograph in clinical medicine have been apparent for more than two decades, and the application of this diagnostic adjunct in cases in which the clinical history cannot be relied on is an additional weapon in the identification of questionable cases.

Let it be presumed for the moment that the sole basis for the diagnosis of coronary disease was vested in the electrocardiogram, and that we were willing to accept the diagnosis of cardiac disease as revealed by its inscription in order to appraise its value as a single diagnostic method. Let it further be presumed that the various graphic abnormalities which my experience has taught me to consider as being significant, and which I have discussed, are, in truth significant. The analysis of the data in this study would at once indict 1,224 (60.1 per cent) of 2,000 patients.

The cases comprising Group 3 (803), that is, uncomplicated coronary sclerosis, are those in which physical examination may fail to reveal conclusive findings on which to make the diagnosis, and in which the diagnosis may rest wholly on the clinical history. This is true in about 25 per cent of the cases. Here the electrocardiogram immediately deletes 433 cases (53.9 per cent). The cases in Group 1 and Group 2 are largely eliminated on physical findings alone.

The examiner, of course, always has many other methods of detection of cardiac disease at his command, and the information available through careful physical examination is, without doubt, the most important. Abnormalities of rhythm, the presence of murmurs, alterations in cardiac tones, increase in size of the heart, as verified by the teleoroentgenogram, elevation or other abnormalities of blood pressure, and so forth, offer a line of defense difficult to penetrate when the examination is carefully conducted and the findings are judiciously appraised.

The electrocardiogram is a diagnostic adjunct and, when properly interpreted, becomes a method of precision that is indispensable in the complete scheme of cardiac diagnosis.

THE BORDERLINE BETWEEN NEUROPSYCHIATRY AND GENERAL MEDICINE*

FRANK J. HIRSCHBOECK, M.D.

Duluth

THIS is a generous subject and were it not for its far reaching importance to the profession I should be loath to discuss it, necessarily, so briefly. One might wish that there really were a borderline between general medicine and neuropsychiatry, as the title implies with its suggestion of distinct cleavage in symptomatology. Experience teaches us, however, that the approach through psychiatric lines is rather through a broad neutral zone supplying one of the most fruitful fields of medical practice, to the clinical possibilities of which the profession seems to stand in singular disregard.

The reasons are several. The young doctor, fresh from school, seems poorly trained for the appreciation of such abstract phenomena as personality changes. This is in part due to his youth and lack of experience, but also largely because his course is one of studied objectivity from beginning to end. Concrete sciences are taught in the greatest detail, but abstract considerations, such as psychology and sociology, are suggested only as helpful electives in the premedical course. In his clinical years lack of space in the teaching hospitals or a lack of interest on the part of his teachers, who are interested particularly in the objective side of medicine, militate against an intimate acquaintance with the so-called "functional states," and his training in this huge field of medical practice is only accomplished through a receptive appreciation within himself, combined with an active and extensive practice. Unfortunately many physicians also are not so constituted as to ever incorporate an understanding of this type of practice into their medical consciousness, and an obstinate objectivity persists through life, with the usual disfavor of the orthodox toward the heretic.

---

*From the Duluth Clinic. Presented before the Minnesota Society of Neurology and Psychiatry in conjunction with the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

The poor patient, as a result, is oftentimes the unfortunate victim. The psychiatrist who understands him, rarely sees the true borderline patient because the latter is the last to admit a psychopathic approach and shuns his advice. The uncertainty of his condition, his apprehension and his failure to get well, lead him from his family doctor frequently to consult a round of specialists, who only too often, by therapeutic shortcuts, tend to relieve him by surgical procedure rather than by the more circuitous psychological approach. He turns to the unorthodox practitioner and healer, who, to the disgrace of the profession, oftentimes accomplishes more than the trained physician. If all his efforts at relief meet with failure he ultimately accepts his invalidism or gives up, despairing of cure. I have witnessed so much needless surgery, and lack of accomplishment, in the treatment of these cases, that I do not wonder at the apparent success of some of the cults. Certainly this lack of interest and understanding does not redound to the ultimate good of the profession, and is, I believe, one of the greatest reproaches to medical skill and professional ideals.

One need not be a skilled psychotherapist nor does one require thorough psychiatric training to treat these unfortunates, but there must be an understanding of human nature, a benevolent sympathy and that sense of proportion so commonly known as "horse sense." With such attributes, so often a part of the successful general practitioner, more can frequently be accomplished than with mountains of specialistic zeal. It is not with the more outspoken psychoneurotic conditions that confusion prevails. The major hysterical states and anxiety neuroses are easily identified. The difficulty seems to lie chiefly in that large group of so-called "neurasthenics," with the exhibition of abnormal fatigability and irritability, emotionalism, and the milder anxieties associated with functional symptoms projected into the somatic sphere, frequently so difficult to distinguish from true organic disease. Patients who are neurotic are as prone to physical illness as those who are not, and it should be borne in mind that every normal person is in part neurotic, and every neurotic is much normal, and each element may supply its integral part in the clinical ensemble. It is astonishing how recovery from an intercurrent illness changes an underlying neurosis so little. That there is a temporary remission is not to be wondered at in view of the focusing of the patient's mind on the determinative illness, and the good wishes and attentions of his friends and attendants tend temporarily to foster improvement. The greater misfortune lies in those instances where a condition is assumed to be a neurosis to the neglect of an obscure incipient tuberculosis, brain tumor, general paresis or malignancy. The crux of diagnostic evaluation lies in these confusing situations.

It is our tendency to make an indirect diagnosis of a neurosis and a functional state only after the most extensive and expensive diagnostic procedures, and we do not heed sufficiently the symptomatic ensemble of the neurotic, which in itself is so characteristic. In fact, so much is this true that a direct diagnosis of a functional condition can, as a rule, be made just as exactly as the diagnosis of more specific organic disease, such as peptic ulcer or bronchiectasis. A direct diagnosis of a neurosis is not justifiable unless a positive cause for the diagnosis can be established. Macy and Allen recently reported the accuracy of diagnosis of chronic nervous exhaustion on 235 patients. They found this to be about 95 per cent, a gratifying accuracy to be sure. These patients were all studied exhaustively over a period of several years. Of the fourteen patients in whom the diagnosis was in error, three had tuberculosis, three chronic encephalitis and two hyperthyroidism—the usual sources of diagnostic conflict.

The general symptoms in the neurotic patient are characterized by their variability and lack of definition. The patient's suggestibility is striking. His recital is filled with detail, lacking in the forthrightness of organic disease. Due to the lack of sympathy among his listeners to his oft repeated tale of complaints he soon learns to augment his story by the use of superlatives, and the minor initial expression is changed to a woeful tale to impress his audience the more. Charcot describes him as "the man with the little piece of paper," and I recall this every time a neurotic consults me with his carefully written, serial list of symptoms, lest he overlook the minutest points. Certain symptoms often dominate the picture, as irritability and fatigability, gas belching, air hunger, vague, fugitive, so-called "neuralgic" pains, vertical and occipital cephalgia, palpitation and paresthesias. One can conceive of few organic ailments which would fulfill all these symptomatic requirements. The problem should arouse a consideration, possibly, of hyper- or hypothyroidism, tuberculosis, organic heart disease, hypertension, brain injury or other organic nervous disease. Their elimination as etiologic agents should not make one hesitate to make a diagnosis of a functional disorder, since it is, after all, the most common disorder of the consulting room. When the symptoms are projected into some somatic zones, to the exclusion of others, as in the patient who fears heart disease, tuberculosis or cancer, the consultant is oftentimes led astray to temporize and hesitate because of his uncertainty of diagnosis, to the disadvantage of both the consultant and the patient. The consultant, by his vacillation between the diagnosis of organic and functional disease, is in the position of the ass who couldn't decide between the two bales of hay—and the patient's manner soon reflects the uncertainty of the physician.

Hence, one should first carefully note the history, with its elaborations; note the manner of its presentation, and the demeanor of the patient. Pediatricians tell me that even in children who are barely able to talk, they can, frequently, by the child's mannerisms, detect the propensity toward the neuroses and functional states. A general and not too cursory an examination should be made of each patient, and conclusive diagnostic tests resorted to, with suitable laboratory aids, but once the absence of organic disease is established with reasonable certainty a forceful and unequivocal statement should be made and the treatment outlined. The first prerequisite of the latter is a specific statement as to the nature of the dysfunction, supplemented by a thorough explanation of its apparent causation; and, lastly, medicinal, hygienic and social advice. A broad foundation of understanding must first be established in the mind of the patient, to be followed by a therapeutic approach to meet the individual needs.

One of the most confusing situations is the question of hyperthyroidism. Obviously, it is the borderline case which offers the difficulty and not those with the more frank hyperthyroid symptoms. As a corollary it may be stated that it is in these instances that surgical haste is least essential and ample time for observation is offered. The criterion for its diagnosis is oftentimes an acceptance of a moderate elevation of the metabolic rate, but its accuracy and a repetition of the test to insure that it is truly basal is not insisted upon. Dr. Lahey aptly said that an essential difference is that the neurotic doubts his ability to carry on effort but can accomplish things, whereas the hyperthyroid patient is confident of his ability in physical effort but lacks the strength. The pessimism of the one and the optimism of the other are antithetical. The neurotic has a history of long duration and of indeterminate onset, whereas the hyperthyroid patient usually can attribute the origin of his illness to a certain event. The good appetite of the hyperthyroid patient, oftentimes associated with a loss of weight, is characteristic, and in marked contradistinction to the capricious and uncertain digestion of the neurotic. The neurasthenic patient usually feels better during periods when his attention is diverted, though it may be recreative physical exertion, but effort of any kind is usually accompanied by shortness of breath and early exhaustion in the hyperthyroid. Though the objective symptoms of hyperthyroidism may be few and simulate the findings in a neurasthenic, they are found to be more persistent in spite of rest, which usually favors the neurasthenic, and are more persistent than the frequent fluctuations of the nervous patient.

Tuberculosis, particularly pulmonary tuberculosis, is frequently a source of diagnostic error. It is not that the diagnosis of tuberculosis is made too often in the neurasthenic, but rather that the patient who has tuberculosis, particularly of the milder type, is thought to be neurotic rather than the victim of organic disease. The family and personal history of the tuberculous patient, the history of contact, the symptoms suggesting a pulmonary affection, and particularly and conclusively the value of the x-ray, should aid in a rapid elucidation.

One of the reasons for the failure to identify organic nervous disease in patients is the lack of knowledge on the part of the physician in not only being unable to interpret the physical evidences of organic disease, but, what is more to the point, also unable to make a thorough examination of the nervous system. The Continental belief that every general practitioner and certainly every internist should have a thorough understanding of neurology seems lacking in this country. The broad principles of neurologic examination and interpretation should be known, so as to avoid pitfalls wherein chronic encephalitis, general paresis or multiple sclerosis, to mention a few glaring examples, may not be confused with simple functional complaints. Time does not permit of further elucidation, but most confusing evidences and opinions are heard in medico-legal situations involving the nervous mechanism. One need not lean awkwardly toward the view of such ardent organists as Straus and Savitsky, who in their recent article in the *Archives of Neurology and Psychiatry,* seem to conclude that all symptoms complained of by persons with head injury should be recognized as indicating definite anatomical pathology, to the virtual exclusion of psychogenic factors, but the consultant must be in awareness of such possibilities. Their article, at least, encompasses the methods of examination which would minimize mistakes; yet, where pyschogenic characteristics, motivated by cupidity, resentment and greed, can so easily prevail, too much credence cannot be placed on the complaint of subjective symptoms not borne out by objective data. The gullibility of the plaintiff's physician and the obstinacy of the defendant's witnesses (if I may be pardoned for using the possessive term) afford a stalemate so commonly, that such divergent possibilities must be a source of wonder, if not amusement, to the laity. If one is inclined to accept the teaching of Straus and Savitsky that organic injury is the common effect of head injury, he should read an article on "The Post-traumatic Neuroses" (a term which Straus and Savitsky wish to abandon) by Hall and Mackay (Jour. Am. Med. Assn., 102:510), which embodies a worthy rebuttal.

Disturbances of the endocrine system, aside from hyperthyroidism, supply a great field for speculation in functional etiology, one might say in inverse proportion to our actual knowledge of individual and multiple endocrine gland disease. One must not be led astray by theory and animal experimentation and try to apply it too freely to practice. The lack of application need not be a deterrent to further clinical study, but, aside from Addison's disease, thyroid disease, disturbances of insulin mechanism and the frank and outspoken pituitary disorders, promise rather than acceptance should be the rule.

In no field of medicine has there been so much uncertainty as in the study of functional gastrointestinal disease. The misinterpretation of heart symptoms may be similarly discussed, but the heart is not likely to be the subject of surgical attack as is the case in digestive disorders. The borderline gallbladder and appendix will probably always remain as the uncertain elements, but the wholesale removal of these organs because of a failure to analyze the history and symptoms has been a blot on our escutcheon, to which we have all contributed at times, but fortunately with varying intensity of belief and purpose. To further complicate the issue we always have the support of the pathologist for the surgical procedure, and the physician considers himself justified. A careful analysis of the pathological report, however, will often disclose minor evidences of structural changes, which, if they occurred on the pleura, the spleen or the kidney, would be dismissed as of no clinical importance. To argue that the patient's symptoms will be permanently allayed by the elimination of such uncertain evidence of disease is only too often fallacious.

This brings up the question of the patient who has had numerous operations. We frequently see patients who have been operated on from three to twelve times for various reasons. This routine of surgery is usually precipitated by a removal of the gallbladder or the appendix, or both, with subsequent operations performed on the uterus or other abdominal organs, to be followed later on by a series of efforts to relieve alleged adhesions and partial obstruction. The latter diagnosis suggests a remark made by Dr. Haggard at a meeting in Minneapolis a few years ago, in which he said, "Adhesions is the refuge of the diagnostically destitute." This should ever be borne in mind in patients who have had multiple operations without apparent relief. I have heard this discussed by an eminent psychiatrist, who stated that the reduplication of symptoms in the patient may be a "functional overflow," due to the impression on the patient's psyche, obtained as a result of the symptoms developing in the convalescence from the first operation. At any rate, it is striking how the symptoms of operative convalescence are repeated in these patients and afford a reason for further surgical operation. These symptoms, peculiarly enough, frequently resemble those due to intestinal obstruction. Convalescent patients have distention, vomiting, constipation, pain in the abdomen and frequently retention of urine, which condition the hypochondriac and the neurotic patient to the recurrence of these symptoms from time to time. The rather dramatic subjective complaints may be very confusing, and one may be pardoned for making a diagnosis of intestinal obstruction, although a careful analysis and reasonable and thoughtful delay will save many of these patients from frequent operations.

One witnesses the same repetition of symptoms, conditioned by the initial insult, oftentimes in angina pectoris and coronary occlusion, where the patients have repeated attacks of pain again and again, entirely too frequently to be on an organic basis, and probably conditioned only by the underlying organic disease and the psychic trauma resulting therefrom.

Conclusions

1. A plea is made for a more intensive appreciation of the value of psychology and kindred subjects in the treatment of diseases. The frequency of functional complaints is overlooked, whereas it occupies the major part of one's practice. A proper training, experience, and a good sense of proportion, will avail the most in an appreciation of these states.

2. The situation may be viewed from several standpoints: (1) Patients who are victims of purely functional disease; (2) those who have an underlying neurotic background but in whom there is an intervention of organic disease; (3) those patients in whom subsequent observation reveals an error in diagnosis. These errors in diagnosis involve chiefly patients who have organic disease and are misinterpreted as having a purely functional disorder, and those who have only a functional disorder but in whom the diagnosis of organic disease is made and treatment is instituted for its correction without due regard for the psychogenic background.

3. The greatest source of conflict lies in the consideration of hyperthyroidism and other endocrine disorders, organic nervous disease, including post-traumatic phenomena, tuberculosis, cardiovascular possibilities, and gastrointestinal disturbance. These conditions do not include all sources of confusion, but the most conspicuous only.

BLOOD TRANSFUSION IN THE TREATMENT OF SEPSIS*

DONALD K. BACON, M.D.

Saint Paul

SINCE blood first flowed in savage warfare mankind has been mystified and puzzled by the fluid which congeals upon its escape from the blood vessels. To this day certain primitive tribes hold that the courage and other virtues of a fallen enemy may be transferred by drinking his blood. The beginnings of the Renaissance saw more intelligent attempts to promote healing by the use of blood, and in 1492 it is recorded that three small boys were unsuccessfully used as donors in an effort to revive the dying Pope Innocent VIII. We are not certain whether this blood was given by mouth or by injection. Feinblatt[2] considers that the first logical reason for the intravascular injection of fresh blood appeared when Harvey announced his discovery of the circulation in 1628. Later Richard Lower, also an Englishman, was successful in doing transfusions between two dogs. This was in 1665, and, two years later, Jean Baptiste Denys, the physician to the French Court, succeeded in using the blood of a sheep to replace that lost by a man subjected to over-effective therapeutic venesection. In succeeding years the practice became more and more frequent with occasionally a brilliant recovery but more often an indifferent or even fatal ending. Coagulation of the blood to be transfused offered one formidable obstacle to success which Bischoff in 1835 tried to overcome with defibrinated blood. This procedure left the blood saturated with fibrin ferment and added the danger of intravascular clotting to those reactions which are now recognized as arising from the use of incompatible blood.

---

*Read before the annual meeting of the Minnesota State Medical Association, Duluth, July 18, 1934.

It was not until 1900 when Landsteiner[7,8] announced his discovery of iso-hemagglutinins and blood groups that a rational basis for the selection of suitable donors for any given case appeared. Landsteiner's three groups were later expanded to four and systematic measures for their identification devised by Jansky,[4] 1907, and Moss,[11] 1910. Unfortunately the two systems show a reversal of groups one and four, which sometimes causes confusion. Word has recently come from Vienna[15] that three additional blood groups have been discovered, groups M, N and MN. It is not certain that this discovery will affect the practice of blood transfusion as iso-hemagglutinins seem to be lacking and its chief interest lies in the field of heredity and medico-legal studies of parentage.

Once the biological standards of safety were established, technical methods of transfer were not long awaited. Crile,[1] in 1907, devised a feasible method of artery to vein connection which, however, left in doubt the volume of blood transferred. In 1913 Kimpton and Brown[5] brought forth their paraffin coated tubes with cannula necks. Shortly thereafter Lewisohn[9] utilized a weak solution of sodium citrate to precipitate the solution calcium of the blood, which prevented coagulation and made transfusion a leisurely procedure to be carried out with the common graduated intravenous funnel. In the same year, 1915, Unger[14] employed his two-syringe method, using a two-way cock. Since that time literally scores of methods have been devised each of which has its circle of advocates. All, however, have features which may be criticized and the perfect method is still to be developed.

The author has acquired a preference for transfusions done with Vincent's modification of the paraffin coated Kimpton-Brown tubes and unless otherwise stated this method was employed in the cases to be discussed shortly. The method is simple, reliable and satisfactory and does not flood the blood stream with chemicals whose effect is at best debatable. This method has the one drawback that it usually requires final ligation of the veins used in both donor and recipient. This is a small matter in the case of all except professional donors. At such times it is possible to withdraw blood through a special needle so that the vein need not be sacrificed. This method involves less whipping and churning of the blood than any of the mechanized whole blood methods, which perhaps is in some measure responsible for its relative freedom from the more severe and unpleasant types of reaction.

Turning to the uses of transfusion in therapy one naturally thinks first of anemia. Here, all kinds and conditions may be relieved and, in the anemia following hemorrhage, transfusion is, of course, the sovereign remedy. Blood transfusion is sometimes of value in the treatment of infections where drugs, serums and the patient's own waning powers of resistance are inadequate. It seems to be more beneficial in certain types of septic infections and an effort will be made to point out these groups. First in line are the exanthemata and the contagious diseases of childhood. As might be expected from the fact that the average adult has acquired an immunity to these infections and possesses antibodies in his blood the results are, on the whole, good. Landon[6] warns against transfusion in diphtheria complicated by laryngeal involvement or myocarditis. This is largely because of circulatory mechanics where an overload might be more than the damaged myocardium could handle. He finds it of value in scarlet fever, measles and pertussis and their complications. He also advises its use as a general tonic in protracted cases with anemia and malnutrition. The average mild, self-limited case in this group, of course, needs no recourse to blood transfusion.

In certain other acute infections, notably pneumonia and typhoid, the reports in the literature are frequently conflicting, favorable reports being counterbalanced by more gloomy ones. Pneumonia certainly of type one and perhaps others would probably have a more favorable reaction from the correct antiserum. Typhoid, if complicated by hemorrhage, should benefit by transfusion. Otherwise only a general tonic effect is probable.

It is in the suppuration due to the common pyogenic cocci and in the septic complications of primary non-suppurative diseases that the greatest field of usefulness for blood transfusion seems to exist. Some writers become quite eloquent about the excellent results secured, while practically all admit that a certain minimal number of such patients who have not benefited by other forms of therapy are cured. In these cases, of course, transfusion aids but does not replace necessary surgical drainage. Operative measures should first be carried out in a thorough going fashion and then the supportive transfusion given. Occasionally this sequence may be reversed and the transfusion given first. If suppuration is merely threatened but not actually present surgical measures may possibly be forestalled.

Numerous writers recognize the special benefits of transfusion in individuals with pyogenic infections and septic sequelæ. Lillie[10] has secured excellent results in the complications of middle ear infection. His use of a combination of transfusion with the injection of bactericidal dyes in some cases however leaves us a bit uncertain of where the credit belongs. Hume[3] concludes that "the treatment of generalized infections is on the whole disappointing" but elsewhere rather paradoxically states of transfusion that he "uses it regularly and sometimes repeatedly" a viewpoint not without significance.

Finally come the chronic diseases such as tuberculosis and lues. From transfusion they may derive some slight tonic benefit but certainly nothing in the way of curative action.

I have very largely expended my personal efforts in the administration of transfusions in patients with suppurative complications of diseases which are primarily not suppurative and infections due to the pyogenic cocci. Of seventy-five patients who in the past eight years were given blood transfusions for septic conditions, seventeen, or 22.6 per cent, either died or received no benefit; forty-nine, or 65.3 per cent, were benefited and their recoveries hastened while in nine, or 12 per cent, transfusion seemed to have life-saving value. The cases in this series include those of otitic origin such as sinus thrombosis, mastoiditis and meningitis; also post-pneumonic empyema, puerperal sepsis, septic arthritis, osteomylitis and septicemia from dental sepsis, and septic bacteremia. Many of these cases had already been treated by other means with little or no benefit and were decidedly poor risks, a few being almost moribund. The following cases are illustrative of the types encountered and the difficulties met.

Case 1.—K. L., a boy of two years and two months, was admitted to hospital March 3, 1926, having had a double otitis media and cervical ademitis of six weeks' duration, and was suffering from pain and swelling back of the left ear. Mastoid operation was performed April 5. The fever and signs of sepsis continued unabated until April 11th, the temperature having touched 105°, pulse 150-160. He was given a transfusion of 300 c.c. of whole blood. He showed slight improvement the following day and progressive recuperation until his temperature reached normal on April 16, with pulse of about 120. He continued in satisfactory condition without complete recovery until April 30, when the right mastoid became painful and swelled and his temperature rose. The right mastoid was opened on May 4, and he proceeded to an uneventful recovery, being discharged from the hospital May 11.

Case 2.—C. M., a schoolboy of eight years, was admitted to the hospital on May 15, 1929, for pain and swelling back of the right ear, which had been draining for one month. He was having alternate chills and sweats with rapid temperature swings suggestive of sinus invasion. A perisinus abscess was evacuated May 18. He continued until May 20 to have the same septic fever and pulse of 110-120, when he was given 600 c.c. of whole blood. The red cells rose from 3,992,000 to 5,088,000 and the hemoglobin from 72 to 79 per cent. The pulse dropped to an average rate of 90-100 and the temperature swings narrowed until May 29 they became normal. There was a small flare-up on June 2 which was relieved by removing obstructive packing. There was a rapid healing of the mastoid wound and he was discharged well on June 10.

Case 3.—C. A., a male child of sixteen months, entered the hospital with a right otitis media. A paracentesis of the ear was done the following day, January 1, 1933. His condition became worse, involving the mastoid, which was operated upon January 3. Following this the temperature dropped to normal, where it remained until January 6. It again rose accompanied by increased postauricular drainage. Wide temperature swings with alternate chills and sweats appeared. There was also a cough and blood streaked sputum and x-ray showed an upper left broncho-pneumonia. This condition continued with progressive loss of weight and strength for eight days, when a blood transfusion of 300 c.c. was given. Within twenty-four hours the fever dropped by crisis and the child made an uneventful recovery.

Case 4.—A. G., a school girl of six years, came to the hospital May 3, 1933, five weeks following measles, with a discharging right ear. She had a high fever and pulse rate and May 5 the mastoid was operated upon and the sinus uncovered but not opened. A 500 c.c. transfusion on May 6 improved both the color of the patient and the quality of the pulse, but did not alter its rate nor the temperature. May 13 a second 500 c.c. was given and for the three succeeding days both pulse rate and temperature were lower. May 19 streptococci were reported in the blood culture. May 26 a third 500 c.c. transfusion was given with seeming benefit to her general condition but no pronounced reaction in pulse nor temperature. A fourth transfusion June 6 initiated a period of lysis lasting ten days and the patient made a good recovery.

Case 5.—L. A., a female child of fifteen months, entered the hospital February 10, 1933, with a lobar pneumonia of the left upper lobe. She was severely ill for a month and on March 13 purulent fluid was aspirated. The fever ranged from 100-101, pulse rapid and feeble. March 16 a rib resection was done and thick yellow pus containing streptococci drained from the pleural cavity. March 19 300 c.c. of whole blood was transfused and the hemoglobin rose from 37 per cent to 67 per cent. In four days the temperature had become normal and in eleven she left the hospital seemingly well.

Case 6.—A. L., a married woman of thirty-eight, had a normal delivery April 7, 1927. April 8 she was pale and weak and her temperature rose to 101 and averaged that for some days. The lochia developed a foul odor and her hemoglobin dropped to 20 per cent. April 19 the patient seemed in a precarious condition and was given 900 c.c. of blood by transfusion. The hemoglobin rose to 44 per cent and she felt much improved. The temperature dropped from 103 to normal and the pulse from 120 to 90 in four days. She remained in the hospital for six more days and went home still anemic but without signs of infection.

Case 7.—M. B., a housewife of forty, was seized with fever and painful joints on September 8, 1931. She developed a toxic delirium and had a fever which at times reached 103. The left knee became swollen, red and acutely painful and transitory pains were felt in other joints. Cultures from the blood and left knee were repeatedly sterile. After the illness had continued without either mental or physical improvement for a month she was given 500 c.c. of whole blood on October 7. This was followed by a chill and a severe reaction lasting two days, during which time repeated intravenous infusions were given. The orthopedic consultant stated definitely at this time that the left knee was improved. On October 13 the mental condition was improved and on the seventeenth she seemed entirely clear. The temperature dropped by lysis and became normal October 19. She made a slow but steady improvement and left the hospital December 12.

Case 8.—A. W., a postal clerk of thirty-six, had a tooth extracted February 26, 1932. The following day he had a chill and a profuse hemorrhage from the site of extraction. The ensuing week he had frequent chills and bleeding from the gums, nose, stomach, and bowels. He became worse and when first seen March 15th his hemoglobin was 18 per cent and he seemed moribund. A transfusion of 1300 c.c. raised the hemoglobin to 38 per cent. The pulse rate and fever continued high. March 20 the blood culture showed hemolytic streptococci. March 22, 600 c.c. of whole blood were given, followed in the next four days by improvement and a remission in the temperature and pulse rate. April 6, 600 c.c. of whole blood were given. He seemed much improved and April 8 the pulse and temperature were normal. A mild fever April 12 to 14 quickly subsided. April 16 the hemoglobin was 62 per cent. During the next two weeks seven abscesses containing from an ounce to four ounces of pus were evacuated from the deep muscles of the right shoulder, left pectoral region and the glutei and adductor muscles of both sides. He made an eventual good recovery.

The above eight cases were admittedly reviewed because of the definite benefit received. Many others did practically as well. In Case 7 there may be some doubt whether improvement was due to the transfusion or the reaction following. In all cases the degree of illness and toxicity was far more severe than the bald clinical outline reveals. Other patients derived no benefit or died; for example, the man whose mastoiditis progressed to sinus thrombosis and pulmonary embolism before transfusion could be done. Due to laboratory errors two patients were given incompatible blood. In each instance transfusion was stopped when about 100 c.c. of blood had been injected because of the typical symptoms of dyspnea, precordial pain and marked agitation. Both patients showed yellow skin, conjunctiva and secretions on the following day. One of these, a woman with puerperal sepsis, recovered despite the transfusion. The other, a boy with otitic complications, died probably from his meningitis. Transfusion benefited neither.

Of those patients who recovered, a certain few did so with a dramatic, crisis-like fall of temperature and sudden restoration to comparative health. But one explanation seems to fit these circumstances, namely that the new blood possessed some variety of preformed immunity to the existing infection, though no effort was made to supply immune donors. Other cases showed improvement only after days. Our knowledge of the chemical nature of immunity is so rudimentary that we do not know how to produce it as needed except in a few specific instances. Smallpox and typhoid may be prevented through the immunity following vaccination. Diphtheria and sometimes tetanus and gas bacillus infection may be cured through immune horse serum, but again we know little of the chemistry or mechanism involved beyond the fact that the immune bodies seem to be closely associated with the globulin fraction of the blood serum. In certain of these transfusion cases one gains the impression that raw material for the manufacture of immunity has been supplied and that after it has been processed in the cellular chemical factory of the body, increased immunity appears. Okamoto[12,13] has shown that the recipient's serum following transfusion contains increased agglutinins and opsonins against infection. In addition almost any illness may benefit from the filling of depleted blood vessels and the additional oxygen carried by the new hemoglobin.

Summary

Blood transfusion is frequently of great value in treatment of infections due to the pyogenic cocci acting either as primary invaders or producing suppurative complications in other diseases. Although we do not understand the mechanism of it, certain cases seem to react to transfusion by the formation of increased immunity.

Bibliography

1. Crile, G. W.: The technic of direct transfusion of blood. Ann. Surg., 46:329, 1907.
2. Feinblatt, Henry M.: Transfusion of Blood. MacMillan Company, New York, 1926.
3. Hume, W. I.: Treatment of generalized infections by blood transfusions. Kentucky Med. Jour., 31:93-96, (February) 1933.
4. Jansky, J.: Haematologicke studie u psychotiku., Sborn. klin., 8:85, 1906-1907.
5. Kimpton, A. R., and Brown, J. H.: A new and simple method of transfusion. Jour. A. M. A., 61:117, 1913.
6. Landon, John F.: Blood transfusion in the acute infectious diseases. Am. Jour. Med. Sc., 180-514-525, (October) 1930.
7. Landsteiner, K.: Zur Kenntnis der antifermentativen, lytischen und agglutinierenden Wirkungen des Blutserums und der Lymphe. Centralb. f. Bakteriol, 28:357, 1900.
8. Landsteiner, K.: über Agglutinationserscheinungen normalen menschlichen Blutes. Wein. Klin. Wchnschr., 14:1132, 1901.
9. Lewisohn, R. A.: A new and greatly simplified method of blood transfusion. A preliminary report. Med. Rec., 87:141, 1915.
10. Lillie, Harold I.: General sepsis of otitic origin. Treatment by blood transfusion and germicidal dye. Arch. Otolarying., 7:30-40, (January) 1928.
11. Moss, W. L.: Studies on iso-agglutinins and isohemolysins. Bull. Johns Hopkins Hosp., 21:63, 1910.
12. Okamoto: Effect of blood transfusion upon agglutinins. Jour. Orient. Med., 17:7, (July) 1932.
13. Okamoto: Effect of blood transfusion upon hemolysins. Jour. Orient. Med., 17:10, (August) 1932.
14. Unger, L. J.: A new method of syringe transfusion. Jour. A. M. A., 64:582, 1915.
15. Vienna Letter: Jour. A. M. A., 102:1864, (June 2) 1934.

EUPHYDIGTAL NOT ACCEPTABLE FOR N.N.R.

The Council on Pharmacy and Chemistry reports that Euphydigtal (Byk-Gulenwerke, Berlin, Germany; Byk, Inc., New York, American agents; Adolphe Hurst & Co., Inc., New York, General Distributors) is said to be a combination of Metaphyllin and digitalis. Each tablet is stated to contain 0.1 Gm. of Metaphyllin and 0.1 Gm. of powdered digitalis leaf ("150 frog doses"). Each suppository is said to contain 0.2 Gm. of Metaphyllin and 0.15 Gm. of powdered digitalis leaf ("225 frog doses"). Metaphyllin (formerly called Euphyllin) is said to be a combination of approximately 78 per cent of theophylline with ethylenediamine, having the advantage of being more soluble than theophylline. Advertising for Euphydigtal received by a physician in April, 1932, states that "the action of digitalis can be considerably increased by the simultaneous administration of Metaphyllin." This is a remarkable statement in view of the fact that up to about 9 grains of digitalis daily is recommended in the form of Euphydigtal. Among the great advantages claimed for Euphydigtal are: "By reason of the vaso-dilatant action of Metaphyllin, particularly that on the coronary vessels, Euphydigtal may also be given in cases of heart decompensation with raised blood pressure for combating the insufficient symptoms, as the bloodpressure-decreasing characteristic of the Metaphyllin constituents forms a safeguard against any further rise in the blood pressure by means of the digitalis." It is well known that patients suffering with cardiac disease and nephritis often require both digitalis and one of the purines, such as theobromine or theophylline, and it is considered in the last degree irrational to use a mixture of digitalis with any other substance. There is no evidence that Metaphyllin possesses the capacity for causing marked coronary dilatation in cases in which it is imperatively needed: and it is misleading to state that digitalis constricts the coronaries, because there is no evidence that digitalis has such action, especially when used in the presence of coronary sclerosis. The Council declared Euphydigtal unacceptable for New and Non-official Remedies because it is an irrational mixture of digitalis and a theophylline preparation marketed under an uninforming, proprietary name, with exaggerated and unwarranted claims for its therapeutic value. (Jour. A. M. A., July 8, 1933, p. 124.)

W. A. Coventry, M.D.
President, Minnesota State Medical Association
1935

EDITORIAL

MINNESOTA MEDICINE

Official Journal of the Minnesota State Medical Association

Published by the Association under the direction of its Editing and Publishing Committee

EDITING AND PUBLISHING COMMITTEE
J. T. Christison, Saint Paul
A. S. Hamilton, Minneapolis
E. M. Hammes, Saint Paul
T. A. Peppard, Minneapolis
Waltman Walters, Rochester

EDITORIAL STAFF
Carl B. Drake, Saint Paul, Editor
W. F. Braasch, Rochester, Assistant Editor

Annual Subscription—$3.00. Single Copies—$0.25
Foreign Subscriptions—$3.50.

The right is reserved to reject material submitted for editorial or advertising columns. The Editing and Publishing Committee does not hold itself responsible for views expressed either in editorials or other articles when signed by the author.

Classified advertising—five cents a word; minimum charge, $1.00. Remittance should accompany order.

Display advertising rates on request.

Address all communications to Minnesota Medicine, 2642 University Avenue, Saint Paul, or 324 Fourth Avenue South, Minneapolis. Telephones: Nestor 1381 and Dupont 1013.

BUSINESS MANAGER
J. R. Bruce, Saint Paul

Volume 18 JANUARY, 1935 Number 1

State Sickness Insurance

The new year will bring new problems to the leaders of our State Medical Association. Our past president, Dr. Savage, has energetically led our Association the past year and our president for 1935, Dr. Coventry, possesses the qualities of leadership and is conversant with State Association affairs through years of experience. No more important problem will be confronted this year than the sickness insurance bill to be presented to our State legislature.

Those who had the opportunity to hear Dr. Morris Fishbein deliver his admirable address last month before the Ramsey County Medical Society on the developments in Washington in Social Security matters must have realized that our national medical organization is doing all that is humanly possible to prevent social reformers from forcing the government to adopt radical medical legislation.

Those of our readers who read in our last issue the article concerning the Health Insurance Bill, the child of the American Association for Social Security, which is to be submitted to our State legislature, must realize that the people of Minnesota will be called upon to decide whether they wish to follow the lead of Germany, England and other European countries in the matter of compulsory health insurance.

Without going into the merits or demerits of the proposals which have had such widespread discussion suffice it to say that those of our profession who have given the subject much study and thought believe that compulsory sickness insurance leads to inferior medical service and is therefore a detriment to the public.

Apparently the question of the adoption of compulsory sickness insurance is to be decided by the several states instead of at Washington. The public gets what it wants. However, our legislators should be informed in no uncertain terms of the conviction of the physicians of the state that this insurance is not for the best interests of the people of the state.

Fifty Years After Trudeau

1885 - 1935

The late Longstreet Taylor* (the "Minnesota Trudeau") within eight years after the beginnings at Saranac Lake, New York, built his own private sanatorium for tuberculosis and began a very noteworthy and successful crusade. At the recent meeting of the Minnesota Public Health Association twenty-two sponsors were named Thus, a very active group of self-sacrificing men and women have found pleasure and satisfaction in lending their talents and support to the upbuilding of a general massed opinion that has been of the greatest benefit to our administrative health officials.

The original emphasis upon tuberculosis and its prevention has yielded, as the work has been taken over by our health departments and sanatorium boards, to an emphasis upon various other diseases and their prevention. Publication of a health magazine that is worthily crusading for logical guidance to better living and health conditions is indeed a praiseworthy accomplishment.

---

*In 1943 Minnesota health workers should fittingly ceremonialize the half-century mark after the work of this great man. Others, like the late Dr. George Wattam of Warren, might also be honored.

The recognized success of such public health movements against diseases like tuberculosis and diphtheria has encouraged many agencies and laymen to hope that like efforts toward the giant killers, such as cancer, pneumonia and cardiorenal disease, might well bring equally striking results. Health officials, statisticians and actuaries have, however, been prompt in predicting that the "Golden Age of Medicine" has witnessed the maximum of results from such massed movements; therefore, for the distressing degenerative and neoplastic perversions of the later decades of life, the "law of diminishing return," obtrudes itself to offset the value of general educational campaigns, and to magnify the importance and the position of the individual contact and relationship maintained between the patient and his doctor. It is likely for that reason that associations founded comparable to that which pioneered against tuberculosis and laid a secure foundation for discriminating general health propaganda, have not found much acclaim, popular or medical, in fields such as cancer or heart disease.

The pessimistic current trend in our periodical literature stresses what is termed our transition from "the Age of Enlightenment to that of Disillusionment." Wilson and the treaty at Versailles give the usual example, and the supposed victory for democracy is usually portrayed as the beginning of its world obsequies. Something of that sort may well come to us as we review certain of our health triumphs and as we witness the virtual control of typhoid and diphtheria and very promising results with tuberculosis. It may be implied that our main purpose is not within the field of political and economic security, but it must be obvious that some sort of a coherent and interdependent and stable society is necessary to make and to hold the ground already gained. It is most distressing to witness what is happening in Central Europe and how rapidly a crumbling economic structure reflects itself in the state of medical practice, the maintenance of hospitals and reasonable health standards. We see promptly how closely our work is tied up with standards of living and employment, the living wage and general security.

It follows, therefore, that those who direct our health activities should fully keep in mind how closely our ultimate position is tied up with a balanced effort that is within the capacity of society to sustain. The self sustainment of our state association through the universal sale of Christmas seals is one of the most laudable aspects of a national and state anti-tuberculosis campaign. The virtual recognition that other matters than health are of equal or greater importance is another extremely meritorious acknowledgment. Few doctors would hesitate to admit that priceless though health may be it stands subordinated to such essential matters as plain individual honesty or moral integrity, not to mention ultimate justice. It is for these reasons that we look with such favor upon the all-important character building organizations such as the 4-H Club, emphasizing, as it does, in addition to health, the head, the heart and the hands. All power, therefore, to these movements —and the Boy and Girl Scouts are closely allied —that lay not only a foundation for health but for citizenship. It has been wisely written that no political or economic Utopia, however conjured up, can ever rise appreciably above the character level of the people concerned.

E. L. T.

Cigarette Smoking

With the tremendous increase in cigarette smoking since the World War, some 116 billion cigarettes* having been consumed in this country in the year 1930, some of the more recent observations on the functional effects of smoking should be of interest.

Most smokers would have difficulty in describing just why they enjoy smoking. Most cigarette smokers often smoke to excess and are conscious of certain unpleasant effects from overindulgence. The irritation of the respiratory mucous membranes, impairment of appetite, loss of sense of smell, greater fatigue by the end of the day, palpitation, irregular heart action and a lack of a sense of well being have all been described. And yet the temporary stimulation and even exhilaration produced by smoking a cigarette seem to be sufficient reason for smoking.

---

*Incidentally the Internal Revenue department collected the tidy sum of $359,881,000 from the sale of cigarettes in 1930.

The temporary stimulation derived from a smoke is undoubtedly the result of the increase in pulse rate and blood pressure which is doubtless due to stimulation of the adrenal gland. That this physiologic reaction is due to the nicotine in the smoke seems fairly well established in spite of the other ingredients such as pyridine, furfural, hydrocyanic acid, ammonia and carbon monoxide, which have been isolated from tobacco smoke and to which the physiologic action of the smoke has been ascribed. Nicotine administered intravenously will produce the same rise in pulse rate and blood pressure and contraction of the peripheral arterioles that follow smoking. The smoke of cornsilk, on the other hand, contains pyridine and yet its use is not followed by these physiologic reactions. It is said, too, that the pedestrian on Fifth Avenue during heavy traffic absorbs more carbon monoxide than a heavy smoker.

This stimulation of pulse rate and blood pressure varies in degree in different individuals. The effect is temporary and in some tests conducted by Maddock and Coller did not last over twenty minutes. These same authors, among others, showed that the skin temperature, especially of the extremities, is substantially lowered by smoking a cigarette. The temperature of the fingers was lowered 0.7 to 6 degrees and that of the toes 1 to 4.5 degrees by one cigarette. The return to normal temperature varied from five to seventy minutes, that of the toes being slower than the fingers in its return.

Most observers have confirmed the findings of Cannon, Aub and Brings that nicotine stimulates the adrenal glands. Haggard and Greenberg ascribed a rise in blood sugar following the smoking of a cigarette to adrenal stimulation. Blood sugars of over 130 milligrams were but little affected, while fasting blood sugars of 80 or 90 milligrams showed a rise to 120 or 140. Dill, Edwards and Forbes, on the other hand, were unable to confirm this observation. The smoking of one or several cigarettes failed in some sixty observations to show a variation of over 5 per cent in blood sugar values. These authors attribute the appeasement of hunger by smoking to the action of nicotine on the hunger contractions of the stomach, rather than to an elevation of blood sugar.

The absorption of nicotine in smoking is affected by many factors. The fact that many can smoke cigarettes and cannot tolerate a cigar or even a pipe suggests that, aside from the shorter smoke, cigarette smoke contains less nicotine. Rolleston states that cigarette smoke contains much less nicotine than that from a pipe, and cigar smoke lies somewhere between the two. Other factors, of course, have to be considered. There is more opportunity for nicotine absorption from inhaling than from simply puffing, from a dirty pipe than a clean one, from a thick or moist cigar than a dry slender one, from Virginia or Kentucky tobacco than from Turkish or Cuban. Cigarettes moreover vary considerably in their nicotine content—many of the cheap popular American brands being decidedly higher than certain more expensive brands.

The much discussed relation of cigarette smoking to thrombo-angiitis obliterans remains unsettled. Some think there is a distinct causative relation between the two. That some non-smokers develop the disease is a fact. There is no question but that those afflicted with the disease should not smoke, as such individuals show the same capillary contraction in the extremities from smoking as the normal individual.

An important question which has not been settled is whether change in the arteries may result from repeated capillary contraction in the vasa vasorum. This should apply to coronary vessels as well as peripheral ones. Time and further observations should supply the answer.

Individual sensitivity to smoking has not been given much consideration. Allbutt has written about a man who developed an intermittent pulse which lasted for days if he remained in a room for an hour or two where there was much tobacco smoke in the air. We recently encountered a patient who developed an irregular heart action, every other beat being an extrasystole, lasting two weeks following the smoking of a package of cigarettes in two days. Some know they cannot smoke without feeling ill and therefore do not smoke. Whether an appreciable percentage of smokers through a peculiar sensitiveness to smoke sustain extreme functional responses of which they are unconscious but which may lead to deleterious organic change in the arteries remains to be seen.

MEDICAL ECONOMICS

**Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association**

B. J. Branton, M. D. **W. F. Braasch, M. D., Chairman** **J. C. Michael, M. D.**

Dr. Fishbein Speaking

Dr. Morris Fishbein, editor of *The Journal of the American Medical Association,* spent two days and made six speeches, December 17 and 18, in Minnesota.

Two of these speeches, at St. Olaf's College and a Lions' Club luncheon in Saint Paul, also a radio talk, were before lay groups. The others were for doctors.

He reached, perhaps, 2,000 people in person in the course of the two days and those 2,000 have now, for the moment, at least, a saner, better balanced perspective of the place of medicine and its problems in relation to other phenomena of modern life.

They have, also, a new perspective on the social experimentation in general which so excites all types of men, these days. For so long as the vivid impression created by Dr. Fishbein remains there should be no danger of blind radicalism in matters of caring for the sick on the part of that two thousand.

It is unfortunate that Dr. Fishbein could not reach many more. He should reach especially the doctors—backsliders who fail to sense keenly their responsibility for presenting an organized front behind the leadership of the American Medical Association, and also those whose loyalty to their profession leads them, sometimes, to extravagant statement unsupported by the pointed truths which are always at the tip of Dr. Fishbein's facile tongue.

Social Experiments

Following are some paragraphs quoted from informal talks before members of the profession in Saint Paul: They are quoted here to take the place, this month, of the Questionnaire on Social Medicine announced for each issue.

"Social experimentation," said Dr. Fishbein, "requires many generations if it is to result in anything of lasting value. Results never appear in the generation which embarked upon the experiment.

"The great trouble in America is that some of us are trying to bite off in one session of Congress what it has taken Europe fifty years to set in motion."

* * *

"I am constantly obliged to defend organized medicine against the charge of 'stand patism.'

"We Are Not Stand Patters"

"We are not stand patters. We are willing to try any experiment which looks as though it might be the answer to the modern problem of care of the sick poor. But it must be a *controlled experiment.* And we must be assured that, so far as we can control it, standards of practice will not be lowered.

"The matter of human sterilization is a case in point. We may quite possibly arrive at the point where we want human sterilization in America. We should take a lesson from the experience of Germany where more has been bitten off than the German people will be able to chew for some time. It is the estimate of reliable sociologists that sterilization may reduce schizophrenia, for instance, by one-half of one per cent *at the end of seven centuries.*

"Our aim is not to block progress but to do our experimenting gradually. We shall achieve nothing but confusion if we crowd all our legislation into one session of Congress.

No Need To Fear

"Fortunately we have no need to fear any precipitate action on sickness insurance in Washington though insurance schemes may well be tried out in several states.

"We shall be permitted, I believe, to go slowly and work out a sound solution for the problem. We have good reason to believe that the Medical Advisory Board to the President's Committee on Economic Security will listen to the advice of the representatives of organized medicine; that the members will work together to make recommendations upon which all can agree and that the unfortunate split which marked the report of the Committee on Costs of Medical Care will not be duplicated in this board.

What President Roosevelt Says

"We have good reason to believe that the administration is not yet ready to take any action whatever on the difficult problem of sickness insurance. Other forms of welfare legislation are placed ahead of it in the President's list, among them, recovery, old age and unemployment insurance. And there is grave doubt as to just what can be done to take definite action on any of these within the law and without declaring an emergency.

"In that connection, here is the most recent statement of the President on the subject of care of the sick: *'I have repeatedly pointed out to you that the care of the sick is a LOCAL RESPONSIBILITY.'*

Medical Relief

"As to this matter of medical relief:

"There are only four states in the entire country where medical relief can be said to be working well. Just what form the fee bill takes in each instance becomes less important when the plan begins to work. Usually money becomes scarce then and medical bills have to be cut anyway regardless of schedules.

"The prospect for a satisfactory set-up is very good in Minnesota. But no set-up will work without dissatisfaction on the part of somebody.

"Certainly we should recognize that federal medical relief IS State Medicine as far as it goes. It's State Medicine the moment you set up a federal agency to pay for care of the sick.

"The important thing for organized medicine to insist upon is that it may enter into relief arrangements purely as emergency measures. Otherwise, it is obvious that we shall enter into other forms of State Medicine on the same basis.

Who Should Do The Work?

"Among the interesting points that the operation of federal relief has brought to our attention is the matter of what doctors shall be on the relief list. In Chicago the best men did not accept relief work. That allowed the poorest men to get the work. It also exhibited what may be expected from State Medicine. The poorest men will do the most of the work, with the resulting damage to standard of medical care.

"We believe that it is a mistake for the best men to stay out of relief work for that reason. All should take a share.

The Epstein Bill

"As to the so-called Epstein Bill (summarized in the December issue) which will be proposed by the American Association for Social Security to the States this winter, that bill is so bad that it is not even reasonable to suppose that anybody will think of passing it.

"There is no doubt, of course, that the President can put a health insurance bill through Congress at this session if he really wants to do so.

"Fortunately the government, at this time, believes other things should come first. But that does not excuse us from organizing and standing solidly behind the American Medical Association in these matters. No smart government will conceivably act in the face of 100,000 physicians if they present a united front.

What About The Lower Third?

"The question is: Can we get the 40,000 who represent the lower third of medicine, so far as income goes, to sink their individual desires for the good of the profession? The Milbank plan for Health Insurance proposes to give these men $7,000 a year for health insurance practice. To be sure, even if it were possible to pay such an amount—which is extremely doubtful—a large part of the $7,000 would be taken away from them in special taxes and assessments. Can you make them see that?

"One of the most important pieces of evangelistic work any of us can do is to *carry* by *word of mouth* to that lower third the real aims of our organization.

The Surgical Catastrophe

"It seems obvious that what most laymen are interested in is not so much the cost of regular medical care but the cost of the surgical catastrophe. That is, the cost of the major operation which includes hospitalization and other expensive procedures.

"We have actual figures to show that the big insurance companies could indemnify for medical and hospital costs to the extent of, say, $300 at a fee of not more than five to ten dollars a year.

"In spite of the fact that the surgical catastrophe is the real problem, they insure in England for common ills, only. When the catastrophe arrives the victim goes on charity. Insurance thus fails at the point where it is most needed.

* * *

"What may work well abroad, however, may not be good at all in America, though certainly sickness insurance is not working any too well anywhere in Europe. The Germans are in a muddle and they have been working at it since 1883.

"The English, who have been experimenting since 1911, are in a muddle, too. They are applying the homeopathic treatment of a little more of the same ailment to cure the disease.

"In both these countries sickness insurance was forced upon them as a political expedient.

"It is probable that no one scheme will work for the whole of America and each locality must make its own experiments and learn from its own mistakes. At any rate, no one has yet reasoned out a solution that will do for the country as a whole.

"Constantly I hear this: 'Why doesn't the American Medical Association suggest a plan?'

"The American Medical Association will do best, I feel sure, to work with the President's Advisory Board. I think we may have high hopes for this board and the results of its deliberations.

Better Than Weather Reports

"You may be interested to know that a program is under tentative preparation now, to be broadcast over the NBC network, that will answer the series "Doctors, Dollars and Disease" (see the November issue) of the Radio Advisory Council in Education which is being given every Monday night over the Columbia chain. The Columbia program is backed by the Foundations and reflects the Majority Report of the Committee on Costs of Medical Care.

"You may be interested, also, in the fact reported from a reliable source that the "Doctors, Dollars, Disease" program attracts *just slightly more attention than the weather reports.*

On "Lobbying"

"Personally I have always fought the idea of a so-called 'lobby' for the American Medical Association in Washington. Lobbyists are in disrepute. They are defined as persons who attempt to wield undue influence and as such are undesirable. The American Medical Association cannot afford to indulge in that sort of thing.

"On the other hand, we do know what is going on and we are represented at every hearing on bills that are of interest to the medical profession.

"When influence is to be brought to bear it should come from the states themselves, not from the American Medical Association. If all states were as well organized as Minnesota or Wisconsin we could write to each of them when an important matter pended and expect really effective action. In comparison with you men in the congressman's district the American Medical Association carries not a particle of influence with Congress.

"The American Medical Association should be known for the great welfare institution that it is, not a lobby for a 'medical trust.'"

The Council Meets

Annual Meeting

The 82nd Annual Meeting of the Minnesota State Medical Association will be held at the Minneapolis Auditorium.

Advance investigations and estimates were reported by Dr. E. A. Meyerding, secretary. The council agreed with Dr. Meyerding and officers of the Hennepin County Medical Society that no other available hall was adequate for the meeting, which, being timed to coincide with the summer meeting of the American Society for the Advancement of Science at the University of Minnesota, promises to be the biggest, in all respects, ever staged by the state society.

The question of paying for the meeting is a serious one since expenses will be several times as high as in former meetings.

The necessity for increasing the technical exhibit section to help cover these expenses was pointed out by the Council.

The meeting should be of unprecedented importance, scientifically, to physicians all over the Northwest. By the same token it should have an unusual importance and value to the commercial houses that supply physicians. Every member is to be urged by the Council to bring the meeting to the attention of representatives of these houses.

Tentative decision was made to hold the 1936 meeting at Rochester and the 1937 meeting in Saint Paul.

More Members

On the bright side of the membership picture was the report of the secretary of a paid membership of thirty-seven more in November 1934 than in November 1933. Paid membership to date is 2,055.

Dr. Engberg Suggests

The State Board of Medical Examiners feels that registration fees should be raised to afford a larger source of income to the Board and its work. Dr. E. J. Engberg, secretary, suggested a fee of $4.00 to the Council which should be so fixed that only the board would have access to the funds.

The $3,000 appropriated by the State Association for the use of the Board a year ago has not been used. It will not be needed, Dr. Engberg assured the Council.

Acting upon authority of the House of Delegates of the Association, the Council authorized the Committee on Public Policy and Legislation and Mr. F. Manley Brist, attorney for the Association and the Board, to assist the Board with any modification of the present Medical Practice act which it may wish to propose at the next legislative session.

County Officers' Conference

Tentative dates for the County Officers' Conference and for the Northwest Medical Conference which follows the next day in Saint Paul, by a well established precedent, have been set for February 23 and 24. Final decision was left to the secretary and to the chairman of the Committee on Public Policy and Legislation.

Any member is welcome to attend either or both of these conferences, the first being devoted mainly to administrative problems and policies of county medical societies and the second to common policies and problems affecting organized medicine in all of the states of this region. Last year's conference brought representatives, officers and council members of nine states to Saint Paul.

Radio: Time For The Dentists

The Minnesota State Dental Association hopes to follow very closely in the footsteps of the medical association in its public health and organization program.

Permission to engage Dr. William A. O'Brien, radio speaker for the State Association, for a monthly broadcast on dental hygiene, on behalf of the dental association was asked of the Council.

The Council agreed to a four months' experiment during which time Dr. O'Brien may give a monthly talk on dental health provided the plan meets with the approval of Dr. O'Brien himself and of WCCO, which has so generously given its radio time for six years to the association. The dentists, of course, will pay costs.

No Loan Fund

The Council has no loan fund and deems it unwise to establish a precedent for making loans to individual members or their families.

It is the belief of the Council, expressed at this meeting, that it should be the business of the local county or district medical societies to investigate and give what assistance they can.

Diabetes Book

Nurses, dietitians and hospitals will henceforth be allowed to purchase the booklet "Diabetes—How to Make it Harmless," published by the Committee on Diabetes of the Minnesota State Medical Association.

The booklet costs ten cents a copy and cash must accompany each order by ruling of the Council.

Abdominal Pain

A resolution of the Olmsted-Houston-Fillmore-Dodge County Medical Society asking for action on the part of the State Association to curb the sale of purgatives for relief of abdominal pain was referred to the Committee on Public Health Education, L. R. Critchfield, chairman, for conference with the pharmaceutical association and possible action.

What About Koochiching?

Does Koochiching county wish to remain in the Upper Mississippi Medical Society or will it transfer to the St. Louis County Medical Society?

This question holds up the complete re-districting of county medical societies, otherwise approved and operating since the Duluth meeting.

The Council will make a special effort to find out.

What The Masses Want

Said Edward A. Filene (Twentieth Century Fund), on the Doctors, Dollars and Disease program, recently: "The masses want health and they can secure health with adequate scientific attention, for a fixed charge which can be budgeted."

He meant, he said, "a charge so low that it can readily be paid by a large majority of our people."

The social, financial and biologic difficulties that must be encountered and solved before the masses can really budget and secure health according to the insurance plan received small attention from Mr. Filene.

Economical Ashland

From the *Saint Paul Dispatch,* Thursday, December 13:

> REMOVAL OF TONSILS
> TO BE ASHLAND'S GIFT
> TO SCHOOL CHILDREN
>
> Ashland, Wis., Dec. 13—(AP)—Accepting unanimously the suggestion of Mayor J. M. Dodd, a physician, the Ashland city council has voted to have the city finance tonsil removals for school children during the Christmas holidays.
>
> The Christmas "present" for pupils with infected tonsils will cost the city only $5 each, a saving of $20 to $30 on each case over usual expense. About 50 of 2,500 children need the operation, the mayor estimated, but all pupils will undergo examination.
>
> Parents generally commended the proposal, but pupils pointed out it will cut down their holiday.

Literally, a double edged Christmas gift for Ashland boys and girls.

There is a careless, holiday air about this offer of Ashland's Mayor and City Council. But it makes light of an operation that is by no means as simple as it sounds.

Wholesale surgery is a dangerous business at any time of year. It may prove of very doubtful benefit to some of these Ashland children. Under these circumstances, no provision could possibly be made for the careful consideration of each case which is so essential before any such serious operation is performed.

As for the doctors who were to perform the operation for the absurd fee—they had much better make no charge at all.

Medicine Must Lead

"Put on a bold front," says Miss Jean McArthur, Chicago, Executive Secretary of the Public Health Education Committee of the Illinois State Medical Association, to the medical profession.

No other group has so disciplined and educated its members.

No other group has ever contributed so largely or so unselfishly to society.

Other groups assert themselves and the public likes their boldness.

Medicine must assume leadership. It is its right.

These and other interesting observations were recently made as follows by Miss McArthur, whose office in Chicago supplies a news service and operates a flourishing and far-reaching speakers' service for lay groups in Illinois.

Read them.

"There are some, within the profession as well as without, who scoff at the code of ethics. They fail to realize that without such a code, medicine might be subject to the same up-to-date liberalism that gives jobs to vote-getters, judgeships in politics, and that sets murderers and kidnapers free. It is generally accepted that the medical profession has ranked and still ranks as one of the cleanest and best regulated that we have. Do you remember of hearing of any major scandal being placed at the doorstep of medicine? I know of none. What other profession can compete with such a record? Not long ago the dean of one of our law schools stated that medicine was farther ahead in the education and disciplining of its members than the legal profession.

"If these things be true, why does medicine hesitate to put on a bold and united front before the public; why does it allow itself to be intimidated by lay investigators who are paid for finding fault with all that pertains to medicine? No other group contributes more largely or unselfishly to society than medicine. Then why should it not be the dictator of policies? This is no time for hesitation or fear. Other groups assert themselves and the public likes this boldness.

"Medicine must assume leadership and it is its right. It should prohibit lay groups from taking over responsibilities which belong to the doctor. It should not allow itself to be controlled by those unfamiliar with its precepts.

"How can this be done? I think largely through a definite, dignified yet sure process of education of the public. Progress is being made, but results can be hastened by the support of every individual doctor. Coöperation of individuals and county medical societies is paramount.

"It might be well to consider what contribution to society and human welfare has been made by some institutions severely criticizing medicine. Can the history of the health of their employes, the wage scale, their working conditions be held up before the public view as perfect? Have the vast fortunes and endowments built up by such institutions been possible because of the oppression and the low wages of thousands of people employed therein? Have these same employes been able to afford medical care in the self respecting manner of their employers? If the public is going to blame medicine for all the troubles of people today, then the medical profession might well turn the searchlight upon this group of our public and give a report of their findings. I predict it would be anything but flattering."

Seen By The Secretary

Being the Log of the Month of a Medical Executive

Week of November 25—Home sick all week.

All Set!

Sunday, December 2—All day meeting of the Council. It's settled. We hold our 82nd Annual Meeting at the Minneapolis Auditorium. That means the biggest meeting ever put on by the Association may be planned this year.

Here is a chance for a great, compact show with all exhibits and scientific demonstrations, moving picture shows and technical exhibits in one great hall.

Can we meet the expense? We can if we sell a sufficient amount of exhibit space. Actually we must sell nearly twice as much exhibit space as at previous meetings.

Monday, December 3—At the instruction of the Council, conferred with Dr. J. M. Hayes, president-elect of Hennepin County Medical Society, Dr. J. K. Anderson, chairman for local arrangements in Hennepin County, and Mr. Walsh of the Minneapolis Civic and Commerce Association.

Made final arrangements with Mr. Walsh about assistance from the Minneapolis Civic and Commerce Association. Incidentally the latter body is enthusiastic about the prospect of the Auditorium meeting which is to be held jointly with sessions of the American Association for the Advancement of Science and promises to assist in many ways toward making it a success.

Minneapolis Conferences

From this conference to another with Mr. William Brede, who has staged our exhibits so satisfactorily for the last three years; went over the Auditorium floor space and evolved a floor plan which is the best I ever saw for a medical meeting.

Along the two sides of the main exhibit hall, opposite each other, is ample space for exhibits and demonstrations for the University of Minnesota, the American Medical Association and the Mayo Clinic; also many individual exhibits and demonstrations. There will be plenty of room in each case for moving picture shows and any other type of individual demonstration. Flanking the hall on each side are ascending and descending ramps that can be used excellently for small theatres, and the regular Scientific Cinema. There is also a large stage which will be used for demonstration purposes. Beyond the ramps, there are roomy corridors for whatever overflow there may be. And it begins to look as though there would be an overflow!

Paid In Advance!

Tuesday, December 4—Another technical exhibitor paid for space today, which makes five spaces sold to date! That's a record.

Wednesday, December 5—Talked over WCCO, with Mrs. Harlow Hanson, Health Chairman, of the Minnesota State Federation of Women's Clubs, in the interest of the Christmas Seal campaign. Our contact, through the Minnesota Public Health Association, with Mrs. Hanson and this important group of women is of increasing value both to the physicians and the organizations involved.

New Seals

Thursday, December 6—Conference with the Minnesota Association for Crippled Children, Miss Jean Pearce, executive secretary, and Mr. Dan York, president, on the advisability of launching another Seal to raise funds for the crippled children's association. The work of this association is to be commended and supported. The Minnesota Public Health Association has coöperated with this association to put on its annual series of orthopedic clinics for several years and wishes to see it continue its program in Minnesota. There is grave danger for both associations, however, in another Seal sale, since such methods of fund raising are all too easily run into the ground.

December 8, 10 and 12—Radio talks over WCCO in Minneapolis and Saint Paul. Talked about modern methods of tuberculosis control and the Christmas Seal Sale.

Friday, December 14—Spoke at the annual luncheon meeting of the Board of Directors of the Hennepin County Tuberculosis Association. This is an affiliated unit of the Minnesota Public Health Association.

Saturday, December 15—The second meeting of the Committee on Scientific Assembly at the Lowry Hotel in Saint Paul.

Greatest Meeting

The program for the 82nd Annual Meeting that took shape at this meeting is by far the best and the most exciting ever outlined in this state.

Here are the high spots as tentatively determined at this meeting by the committee.

1. There will be at least twelve brilliant out-of-state speakers.

Two or three of these speakers are coming through the auspices of the American Association for the Advancement of Science which is meeting at the same time at the University, laying especial emphasis on its medical program as a consequence of this joint meeting.

2. Following the example of the Minnesota Radiological Society, which, last year, established a lectureship for the state meeting, the Northwest Pediatrics Society, the Minneapolis Surgical Society, the Ophthalmological Society, the Minnesota Academy of Medicine, and the Minneapolis Clinic Club will each bring a distinguished speaker for the meeting.

3. In addition, of course, there will be the annual cancer lecturer brought by the Citizens' Aid Society of Minneapolis, the speaker brought by the State Association itself and the Hennepin County Medical Society. That means an array of great names and both the A. A. A. S. and the medical societies are now busy combing the entire country for speakers.

Anemia Symposium

4. Probably Dr. W. P. Murphy or Dr. G. H. Whipple will be secured by the Hennepin County Medical Society for the symposium on anemia which is to occupy a joint session with the A. A. A. S. Tuesday morning, June 25. They were Nobel prize winners this year for their work on the disease.

Other great medical men in prospect are Dr. Max Cutler of Chicago, Dr. Harry Alexander of St. Louis, Dr. H. K. Pancoast of Philadelphia, Dr. R. G. Hoskins of Boston, Dr. Fred Adair of Chicago, Dr. Chevalier L. Jackson of Philadelphia, Dr. A. A. Cushing of Boston, Dr. F. G. Banting of Toronto and Dr. E. J. Berkheiser of Chicago.

5. Another joint session between the two associations will be held at the University Tuesday night and every afternoon session of both organizations will be at the Auditorium medical meeting since the A. A. A. S. will have no afternoon University sessions.

6. The Scientific Demonstrations which have become a distinctive feature of our Minnesota meeting will be expanded to include a great variety of subjects and processes.

Make Applications Now

It is to be hoped that everybody who wants to present a scientific exhibit or demonstration will make application to the committee now. Space will be at a premium.

7. Twin City medical men will be represented on the program in a clinic which will consume the two first hours of the scientific program Monday morning, June 24. After them will come the hour of demonstrations which will be repeated in the afternoon and each morning and afternoon during the meeting.

8. Other lecture sessions must be reserved for the guest speakers who will be given ample time to make their appearances of real value.

Dr. W. F. Braasch and Dr. Buie of Rochester were in the office today to discuss plans of the Medical Economics Committee and, incidentally, entertainment for Dr. Morris Fishbein, who spends Monday and Tuesday of next week in Minnesota.

Monday, December 17—Most of the day with Dr. Fishbein, who talked under the auspices of the Ramsey County Public Health Association before a general luncheon meeting of service clubs called by the Lions at the Saint Paul Hotel. This was the first of five talks by Dr. Fishbein in two days, during which time the pointedness, interest, and wide range of subjects covered in this extraordinary speaker's performance never flagged for a moment. In the evening went to Northfield, where Dr. Fishbein talked at St. Olaf's College.

Tuesday, December 18—Nearly all day with Dr. Fishbein.

The afternoon was devoted to an informal conference with the Council followed by dinner with invited guests at which Dr. Fishbein outlined the situation at Washington, in Chicago and in all of the states of the country with regard to the Medical Relief and Sickness Insurance and all of the other vital problems of medicine today.

In the evening another talk before a crowded meeting in the rooms of the Ramsey County Medical Society.

Wednesday, December 19—Attended the annual Christmas meeting of Scholia, organization of educators of the Twin Cities. This is a highly valued membership which dates back many years.

Total Is Thirteen

Thursday, December 20—Well! The meeting looks like a success. Our friends have come to the rescue. A total of thirteen spaces has been sold to date to eleven different exhibitors.

Friday, December 21—Conference on Minnesota's fee schedule for Medical Relief with Dr. H. M. Johnson and Mr. Brist.

Saturday, December 22—Merry Christmas!

Minnesota State Board of Medical Examiners

Anoka Masseur's License Suspended For Three Months

In the Matter of the Suspension or Revocation of the License of N. A. Thomas, Masseur.

At a meeting of the Minnesota State Board of Medical Examiners held on December 8, 1934, the massage license of Mr. N. A. Thomas, Anoka, Minnesota, was suspended for a period of three months.

Mr. Thomas had been cited before the Board to show cause why his license should not be suspended or revoked. The citation charged Mr. Thomas with conduct inimical to the best interests of the public, and was based upon certificates signed and furnished by Mr. Thomas to the school authorities at Anoka certifying as to the physical condition of certain school children in the public schools of Anoka. These certificates are the regular forms used by the Minnesota State High School League calling for a *physician's certificate*, as to the condition of the heart, blood pressure, lungs, feet, spine and urine, also whether or not a hernia was present. This certificate is required preliminary to the participation of these children in school athletics. Mr. Thomas admitted signing the certificates, and in view of the fact that Mr. Thomas does not hold a license to practice medicine in the State of Minnesota, but is only licensed as a masseur, the Board found the charges true and his suspension followed.

Medical Board Denies License To Fargo Applicant

J. G. Halland, M.B., Fargo, North Dakota, was denied a license to practice medicine in the State of Minnesota by the Minnesota State Board of Medical Examiners on December 8, 1934. Mr. Halland graduated from the University of Minnesota in 1919, with the degree of Bachelor of Medicine. He was licensed to practice in this State by the Medical Board but had his license revoked in November, 1931, because of habitual indulgence in the use of drugs. Halland's entire case was reviewed by the Medical Board and the Board was of the opinion that the best interests of the public required that no license be issued to Mr. Halland.

(Note: The degree "Doctor of Medicine" was never conferred upon Mr. Halland.)

In Memoriam

Kenneth Simms Caldwell

1892-1934

Dr. Kenneth S. Caldwell, Saint Paul, was born at Farmington, Minnesota, March 13, 1892. Graduating from the Central High School, Saint Paul, in 1911, he attended Hamline University for a year and then the University of Minnesota, where he received his B.A. degree in 1916. While taking his medical course he joined the American Red Cross hospital unit, which was organized at the University under the direction of Dr. A. A. Law in February, 1918, and was honorably discharged from this unit May 29, 1918, to accept appointment as Assistant Surgeon in the U. S. Naval Reserve Force. He received his degree in medicine from the University of Minnesota in June, 1918, and reported for duty at the Great Lakes Training Station. In December of the same year he accepted the appointment as Assistant Surgeon in the Navy and served on the U. S. S. New York and U. S. S. Jason with the Pacific Fleet. On account of physical disabilities incurred in service Lieutenant Caldwell was retired from active service December 14, 1921.

In 1922 Dr. Caldwell was appointed medical examiner for the U. S. Veterans Bureau and opened an office the same year at 642 Lowry Building, Saint Paul. Upon the establishment of medical units for the Minneapolis and Saint Paul post offices, Dr. Caldwell took charge but later devoted his energies to the Minneapolis office alone until 1930.

In 1931 Dr. Caldwell retired from practice on account of ill health. Death occurred October 2, 1934, following an accidental gunshot wound of the chest.

Dr. Caldwell was married October 12, 1918, to Miss Margaret M. Peterson of Saint Paul, who with their two sons survives him. He was a member of the Theta Delta Chi academic fraternity and Nu Sigma Nu medical fraternity, Ramsey County Medical Society, Minnesota State and American Medical Associations.

Energy Claims for Foods.—The Committee on Foods reports that all foods except the simple mineral foods and water contain chemical energy available for use by the healthy body to support the many activities and life processes and incidentally to maintain temperature. This use of the term "energy" in defining the caloric energy value of foods should not be confused with the popular usage signifying the state of extreme well being, good health, vitality, strength, vigor or endurance. Food advertising should correctly inform the public of the energy values of foods in carefully chosen terms that may be properly interpreted. The distinction between the caloric and popular senses of the word "energy" must be recognized and observed. The terms "food value" or "nutritional value" should not be used synonymously with "food-energy value." The food or nutritional value of a food includes the vitamin, mineral, protein, fat, and other values. (Jour. A. M. A., November 10, 1934, p. 1452.)

COMMUNICATION

To the Editor:

Educators have claimed that the rank and file of the medical profession are several years behind in medical education—ten years has been suggested.

Editors have stated that if the general practitioner would but studiously read their offerings, he would not need to be behind at all, and that if back articles have to be referred to, the indexes furnished are adequate and simple.

The general practitioner represents that neither of these classes of critics is right; that there are indeed some men who are a quarter of a century behind, but that the majority strive earnestly and efficiently to keep up.

The busy man unable to keep up by reading goes out periodically and gets pumped up at the University. To be of use to this man an article on a desired subject must be available at a time when his patient's condition calls this subject to his notice—often at the end of fatiguing day. Indexes are consulted, the exact title may be doubtful, his principal Journal confronts him with some 240 long columns per year; if recent articles are looked for the search may be even more laborious. Consultation of current writings might, he thinks, be made more easy for him.

To the end that he keep posted and stop using discredited methods, it would seem to one general practitioner that articles of immediate interest in therapeutics might be indexed in special type; that special indexes running back years might list these items only, the ordinary indexes sufficing where articles are sought for general educative purposes.

H. B. Aitkens, M.D.

Editor's Note: The title of a paper is important in that it should signify the particular phase of the general subject treated. From a cursory perusal of the titles of recent articles which have appeared in Minnesota Medicine, it seemed in most cases possible to determine from the title which ones deal or are likely to deal with therapy.

It would not be difficult to use special type for indexing articles on therapy, but unless the practice were generally adopted by journals we fear such a procedure would be lost on the general reader.

Just to remind you—
Have you paid for
your Christmas Seals?
Your help is needed.

OF GENERAL INTEREST

Dr. Dwight L. Wilbur of Mayo Clinic was in Mankato recently, and gave a talk to the doctors on peptic ulcer.

* * *

Dr. B. Pearson has located in Shakopee following the completion of his internship at St. Luke's Hospital, Saint Paul.

* * *

Dr. Leo R. Prins has moved his office to 229 Lowry Medical Arts Building, Saint Paul, where he is associated with Dr. F. E. B. Foley.

* * *

Dr. H. T. Sherman, formerly of Echo, Minnesota, has moved to Plainview, Minnesota, where he has taken over the practice of Dr. W. B. Stryker.

* * *

Dr. T. C. Kelly of Mankato, who, in the past year, has been through a serious illness, is back in his office again and enjoying good health.

* * *

The annual meeting of the Mankato physicians was held at St. Joseph's Hospital, where a very fine dinner was served by the Sisters of the hospital.

* * *

Dr. W. D. Francis of Morristown, Minnesota, is at St. Luke's Hospital, Saint Paul, where he has been operated upon for osteomyelitis of the left femur.

* * *

Dr. G. A. Dahl of Mankato has gone on a six weeks' vacation, touring the southern states and Mexico. He was accompanied by Mr. and Mrs. Rudolph Bierbauer of Mankato.

* * *

Dr. M. M. Sarnecki has become associated with Dr. Thomas Gratzek with offices at 957 Arcade Street, Saint Paul. Dr. Sarnecki completed his internship at the Ancker Hospital, Saint Paul, in July, 1934.

* * *

Dr. C. W. Froats of the Duluth Clinic was elected to membership in the Central Association of Obstetricians and Gynecologists at the annual meeting of the organization in New Orleans, November, 1934.

* * *

Dr. Emil Goetsch of Brooklyn will be the guest speaker at the annual meeting of the Minneapolis Surgical Society February 7, 1935. Dinner will precede the meeting at the Minneapolis Club.

* * *

Dr. Henry E. Michelson, Professor of Dermatology at the University of Minnesota, has been chosen to present the subject of "Newly Recognized Forms and Facts in Tuberculosis of the Skin" before the Ninth International Congress of Dermatology and Syphilis, which will meet in Budapest in 1935.

* * *

Dr. Arthur W. Neutzman, physician and surgeon, who has been practicing in Wisconsin and has been associated with the staffs of the hospitals at Wausau in that state, has become affiliated with Dr. S. B. Haessly and Dr. Carl A. Traeger of the Central Clinic, Faribault, Minnesota.

* * *

Drs. Martin Nordland and T. H. Sweetser of Minneapolis were recently elected to membership in the Western Surgical Association. Dr. Arnold Jackson, Madison, Wisconsin, is the newly elected president and the next meeting of the Association will be held in Rochester, Minnesota, in December, 1935.

* * *

To provide the program of the Iron Range division of the St. Louis County Medical Society, a group of some twenty-five physicians from Duluth traveled in a chartered bus to Eveleth for the December meeting, December 20, 1934. The program was the request type to repeat a "Pathological Conference" demonstration similarly carried out a year ago. Ten cases and specimens were discussed and demonstrated, meeting with a very enthusiastic reception.

* * *

Dr. Edward David Greenberger, recently associated with the x-ray department of Bellevue Hospital, has taken charge of the x-ray department of the Mankato Clinic. He is a graduate of Bellevue Medical School, interned at Mount Sinai Hospital and Bellevue Hospital, New York City. He is a diplomat of the National Board. Dr. A. J. Wentworth, who has had charge of this department at the clinic for many years, is taking a year's vacation, and Dr. Greenberger is taking his place.

* * *

Following upon the Public Health drive in Duluth to discover the possible presence in the schools of tuberculous teachers, legal action has been taken by a certain teacher group to determine who shall pay for chest films where positive Mantoux tests occur. It is rumored that certain open cases have been found. The teachers apparently do not oppose the propriety of the test. Similar tests have been accomplished in all the St. Louis County schools under the instruction of the County Health Officer, Dr. C. A. Scherer.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for January

The Minnesota State Medical Association Morning Health Service.

The Minnesota State Medical Association broadcasts weekly at 10:30 o'clock every Tuesday morning over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month will be as follows:

January 1—(Holiday).
January 8—Insomnia.
January 15—Appendicitis.
January 22—Problems of the Blind.
January 29—Cancer Research.

Minneapolis Surgical Society

January 10, 1934, 8:00 P. M.
Todd Amphitheater, University Hospital

Papers read to be limited to ten minutes only.

1. Dr. N. Logan Leven—by invitation.
   Visualization of the biliary tract by injection of opaque media postoperatively.
2. Dr. Vernon L. Hart—by invitation.
   Subastragaloid and triple arthrodesis.
3. Dr. William T. Peyton.
   The treatment of some types of arteriovenous aneurysms and cavernous hemangiomas.
4. Dr. Ralph T. Knight.
   Current events in anesthesia.
5. Dr. Herbert A. Carlson—by invitation.
   Variations in the technic of thoracoplasty.
6. Dr. C. Donald Creevy—by invitation.
   Litholapaxy.
7. Dr. Melville H. Manson—by invitation.
   Biological phenomena in Hodgkin's disease.
8. Dr. Owen H. Wangensteen.
   The surgery of hyperinsulinism.

Anyone interested is cordially invited to attend.

Southeastern Surgical Congress

The Southeastern Surgical Congress will hold its sixth annual assembly in Jacksonville, Florida, March 11, 12 and 13, 1935.

The states composing the Congress are Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee and Virginia.

Some of the most distinguished surgeons in the country representing the different surgical specialties have been invited to appear on the program. A partial list of those who have already accepted places is as follows: Doctors Walter C. Alvarez, Perry Bromberg, Hugh Cabot, Willis C. Campbell, George W. Crile, John F. Erdmann, Paul Flothow, Ralph Green, Arthur Hertzler, C. Jeff Miller, Alton Ochsner, J. C. Patterson, J. Knox Simpson, J. W. Snyder and W. A. Weldon.

For information address Dr. B. T. Beasley, Secretary-treasurer, 1019 Doctors Building, Atlanta, Georgia.

Blue Earth Valley

On October 25, 1934, the Blue Earth Valley Medical Society met at the Constans Hotel, Blue Earth. There were twenty-five members present and Dr T. W. Weum of Minneapolis spoke to the society on the subject of Office Gynecology. The following officers were elected:

President, H. W. Sybilrud, Bricelyn; vice president, A. W. Sommer, Elmore; secretary-treasurer, W. C. Chambers, Blue Earth; trustee, John Folta, Ceylon; delegate, A. J. Henderson, Kiester.

Clay-Becker County

At the annual meeting of the Clay-Becker County Medical Society held on December 14, 1934, the following officers were elected:

President, Arnold Larson, Detroit Lakes; vice president, J. W. Duncan, Moorhead; secretary-treasurer, R. V. Jolin, Lake Park; delegate, T. S. Soine, Barnesville; alternate, R. V. Jolin, Lake Park.

Red River Valley

The following officers of the Red River Valley Medical Society were elected at the annual meeting of the Society held on December 11, 1934, at Crookston:

President, A. W. Swedenberg, Thief River Falls; vice president, A. R. Reff, Crookston; secretary-treasurer, C. W. Froats, Thief River Falls; delegates, O. E. Locken, Crookston, and C. M. Adkins, Thief River Falls; alternates, V. A. Weed, Red Lake Falls, and J. A. Roy, Red Lake Falls.

Washington County

The annual meeting of the Washington County Medical Society was held December 11, 1934, at 6:30 p. m., at the Grand Cafe, Stillwater. After the usual order of business, election of officers took place:

President, George F. Brooks, Stillwater; first vice president, V. C. Thompson, Marine-on-St. Croix; second vice president, E. V. Strand, Bayport; secretary-treasurer, E. S. Boleyn, Stillwater; censor, R. J. Josewski, Stillwater; delegate, E. S. Boleyn, Stillwater; alternate, W. R. Humphrey, Stillwater.

Dr. Gunnar Linner, institutional physician at Minnesota State Prison, was elected a member of this society.

A committee of three was appointed to study the old and the new County Society Constitution as adopted by the House of Delegates at the 1934 Duluth meeting.

WOMAN'S AUXILIARY

President—Mrs. Martin Nordland, Minneapolis
Editor—Mrs. C. F. Ewing, Wheaton

East Central Minnesota

Two meetings of the East-Central Medical Auxiliary were held this last fall. The first was held on August 30, 1934, at Anoka. Dr. and Mrs. E. E. Gates acted as hosts. The meeting was held at the Gates home and then dinner was served at the Methodist Church. Later the women were entertained at the home of Dr. and Mrs. Schlesselman.

The second meeting was held October 12, 1934, at the School for Epileptics, Dr. McBroom and his wife acting as hostesses.

The next meeting will be held in Cambridge.

The officers for 1934 are: President, Mrs. H. C. Cooney, Princeton; secretary-treasurer, Mrs. H. J. Kooker, Milaca; vice president, Mrs. Charles Swenson, Braham.

* * *

Mower County

The Mower County Auxiliary meets the fourth Monday of each month. The annual meeting is held in February. At the regular meetings, members sew for the local hospital.

The present officers are: President, Mrs. G. E. Hertel; vice president, Mrs. L. G. Flanagan; secretary, Mrs. R. S. Hegge; treasurer, Mrs. Paul Leck.

A one o'clock luncheon was enjoyed at the Hotel Austin by members of the Mower County Auxiliary, December 6, 1934, fourteen being in attendance. Two out-of-town guests, Mrs. Martin Nordland, state president, and Mrs. W. M. Roberts, state publicity chairman, both of Minneapolis, were present. After a short business meeting, Mrs. J. Haven, program chairman, introduced the speakers, Mrs. Nordland and Mrs. Roberts, who both gave interesting messages in connection with "The Object of the Medical Auxiliary." Mrs. J. M. Thomson of Brownsdale was an out-of-town member present.

* * *

Renville County

The Renville County Medical Auxiliary met at the home of Mrs. R. C. Adams at Bird Island, November 6, 1934. Mrs. Loenhold from Hector gave a travelogue on Scotland, and Mr. Larson, Field Secretary for the State Medical Society, addressed the ladies. All members were present. Dr. and Mrs. Holbrook, from Mankato, and Mr. Larson were guests at dinner, at which there were thirty-two doctors and their wives.

On December 4, the Auxiliary met at the home of Mrs. Cosgraff at Olivia. This was in the form of a Christmas party. A report was given as to the tuberculosis contest essays written in the county. Eleven members were present. Acting hostesses were Mesdames Fawcett and Presinger of Renville.

Rice County

The Rice County Medical Auxiliary sponsored a dinner at the Hotel Faribault in Faribault, Monday evening, November 5, 1934. The guests were the members of the Rice County Medical Society and their wives. Due to the unavoidable absence of Dr. Norman Johnson of Minneapolis, who was to have addressed the meeting, Dr. C. D. Lufkin of Northfield gave an interesting account of his experiences in the Hawaiian Islands. Mrs. O. S. Neseth of Kenyon, the Auxiliary president, introduced the speaker.

The Rice County Medical Auxiliary elected the following officers: President, Mrs. O. S. Neseth, Kenyon; vice president, Mrs. Warren Wilson, Jr., Northfield; secretary, Mrs. J. A. Gates, Kenyon; treasurer, Mrs. M. L. Mayland, Faribault. At the September meeting, Mrs. Maryland asked that her resignation as treasurer be accepted, and in her stead Mrs. A. F. Kieske, Faribault, was elected treasurer.

The Auxiliary arranged a meeting with the Parent-Teacher Association of the Garfield School, Faribault, on November 13, to hear Dr. Meyerding speak on "Public health and its relation to tuberculosis." The five other P. T. A. units of the Faribault schools joined with Garfield school and the members of the medical auxiliary from Faribault, Northfield and Kenyon to form a large and appreciative audience.

* * *

Scott-Carver County

Members of the Scott-Carver medical society gathered at a 7 o'clock dinner at the Rock Spring cafe, Shakopee, Tuesday evening, November 13, 1934. Twenty-two doctors, and ten members of the ladies' Auxiliary were present. After the dinner the doctors convened at the city hall, where Dr. Reuben Johnson and Dr. C. J. Ehrenberg, Minneapolis, addressed them. The ladies repaired to the home of Mrs. F. H. Buck. The Minneapolis physicians were accompanied by their wives, who were guests of the auxiliary.

* * *

Stearns-Benton County

Meetings of the Stearns-Benton Medical Auxiliary are held on the first Tuesday of every month at one of the homes of the members, where members sew on layettes or whatever else is needed, mostly at the time for the Loan Chest, to which physicians and nurses have access, articles to be used in homes that have need of them.

Present officers are: President, Mrs. Harry B. Clark; vice president, Mrs. Wm. Friesleben; recording secretary, Mrs. E. M. Kingsbury; corresponding secretary, Mrs. John J. Gelz; auditor, Mrs. Julius Buscher.

The auxiliary donated $5.00 to the Red Cross and sponsored the Christmas Seal Radio Contest, giving $2.50 to a boy and girl, winners in this county.

* * *

West Central Minnesota

Mrs. E. A. Eberlin of Glenwood was reelected president of the West Central Medical Auxiliary, and Mrs. A. Giesen of Starbuck was reelected secretary-treasurer at the last meeting, which was held at Morris.

PROCEEDINGS *of the* MINNESOTA ACADEMY OF MEDICINE

Meeting of November 14, 1934

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, November 14, 1934. Dr. Archa Wilcox, President, in the chair. The meeting was called to order at 8 p. m.

There were forty-nine members and one guest present.

Minutes of the October meeting were read and approved.

Upon ballot, the following men were elected as candidates for membership:

Dr. R. G. Allison, Minneapolis, Active Membership.
Dr. H. W. Grant, St. Paul, Active Membership.
Dr. R. D. Mussey, Rochester, Associate Membership

The scientific program was as follows:

SURGICAL TREATMENT OF RETINAL DETACHMENT

Frank E. Burch, M.D.
Saint Paul

Dr. Burch read a paper on the above subject and showed numerous lantern slides. (To be published in Minnesota Medicine.)

Discussion

Dr. W. E. Camp (Minneapolis): It has been my privilege to assist Dr. Burch in two or three of these operations at the University Hospital and also to observe several other cases and to see his uniformly good results. I think his success depends on two factors: first, his careful technic, observation, and treatment after operation; and, second, because of his selection of cases for operation. It is not to be expected there would be a good result in cases of long standing.

In speaking of detachment, there are two kinds of detachment of the retina; the kind that is due to a pushing off of the retina due to fluids coming through from the vitreous and, second, those which are due to a pulling off of the retina due to cyclitic exudates. In these latter cases re-attachment is impossible and good vision could not result. But a careful selection of serous detachment cases, combined with our modern technic, gives good results. I am very pleased to hear this paper and see the slides which Dr. Burch has shown.

Dr. Arthur E. Smith (Minneapolis): I think the substitution of diathermy for the cautery has been a great step in advance. The effect of cautery is difficult to control and there is often damage done to subjacent tissue by the transmitted heat. Dr. Burch is to be congratulated on this fine series of cases.

Dr. C. N. Spratt (Minneapolis): One of the sad chapters in ophthalmology is the treatment of detachment of the retina. In the last five or six years, however, much has been accomplished, and more articles have been written on this subject during this short period than the previous fifty years. Untreated idiopathic detachment invariably leads to blindness. Certain traumatic cases may recover spontaneously. The operative cure after modern methods varies from 30 to 50 per cent. Vogt of Zurich states that in 1881, Martin, de Wecker and de Luca used ignipuncture for the treatment of detachment and that in 1896 Deutschmann attempted to cure detachment by ignipuncture at the site of the tear. Galezowski, in 1902, systematically practiced ignipuncture in the treatment of detachment of the retina. Gonin's work has aroused interest in the treatment of detachment. The use of diathermy has simplified the operation and is less likely to be followed by complications than when the cautery is used. Vogt, in the November number of the *British Journal of Ophthalmology,* advocates the use of the cathode or negative pole in detachment of the retina. This is interesting, as Verhoeff, of Boston, seventeen years ago treated detachment by the use of the negative pole. I have had no experience with this but have used diathermy for the past two years.

Dr. Arnold Schwyzer (St. Paul): I would like to ask Dr. Burch why it is so very important to find the hole in detachment?

Dr. Burch (in closing): Dr. Spratt's remarks about evaluation of technic are apropos. Undoubtedly when Vogt, before the Swiss Ophthalmological Society in May, 1934, described the use of galvanism with very low milliamperage as a means of inducing adhesive choroiditis, he may have contributed another important improvement which, although still in the experimental stage, may work out satisfactorily. It is possible also that cauterizing the surface of the sclera with the electric thermophore, as I understand is being tried out at the Medical Center in New York, may offer something of value in the evolution of treatment.

So far as locating the hole and absolute occlusion is concerned, that is the sine qua non in the matter of surgical therapy. It is absolutely proven that best results follow occlusion of this communication between the vitreous and the subretinal space, so that fluid will not continue to pass through the retinal hole or tear and produce a redetachment afterward. At least, one must produce an adhesive choroiditis and wall off the hole so that extension of the detachment cannot occur. It is the first principle in correct surgical treatment of retinal detachment.

HYPERTHYROIDISM IN CHILDREN

Martin Nordland, M.D.
Minneapolis

Dr. Nordland read a paper on the above subject and reported 11 cases.

Summary

Hyperthyroidism in childhood is observed rarely enough in the experience of the average physician to arouse unusual interest. This is manifested by the occasional appearance in the literature of a single case report of this disorder. The authors of articles discussing this subject have variously employed the upper age limits of 12, 14 and 16 years. In the review of the literature it is evident that the number of cases increases rapidly after the 12th year.

Dinsmore, in 1926, reported 48 cases of hyperthyroidism in children treated at the Crile Clinic. In the discussion of this subject in 1932, Rankin reported 91 cases of exophthalmic goiter in children treated at the Mayo Clinic. This number represented 0.6 per cent of a total of exophthalmic goiters treated. More than 90 per cent of the cases of hyperthyroidism in children occurs in females. In this paper, eleven cases of hyperthyroidism in children, from 8 to 16 years of age, are reported.

BASAL METABOLIC STUDIES

TABLE I

Mrs. E. R., age 37 years.

Standard	Sage Aub-Dubois	Krogh's Mod. Aub-Dubois	Harris Benedict	Dreyer	Bailey
Plus	33.3%	43.1%	37.2%	36.5%	33.3%

Normals Sage Aub-Dubois
36.5 calories per sq. meter hour.
Harris Benedict
58.3 calories based on combination of weight, and and age, height flat figures.
Dreyer
58.6 calories, being 10% reduction from figure for males, based on weight and age.
Krogh Modification of Aub-Dubois
33.9 calories per sq. meter hour.
Bedale McLeod—no figures for adults.
Bailey—36.5 calories per sq. meter hour.

TABLE II

L. D., age 16 years.

Normals	Sage-Aub-Dubois	Aub-Dubois Krogh modif.	Benedict Talbot	Bedale McLeod	Bailey
2-17-34	Plus 51.3%	Plus 78.1%	Plus 91.8%	Plus 84.5%	Plus 69.5%
		Ligation and tonsillectomy in May, 1934.			
10- 2-34	Plus 38.7%	Plus 55.7%	Plus 69.3%	Plus 61.6%	Plus 45.5%
		Thyroidectomy October 6, 1934.			
10-17-34	Plus 6.7%	Plus 11.4%	Plus 20%	Plus 15.5%	Plus 4%

Normals.

Sage Aub-Dubois	Calories per sq. meter hour.	15 years 43 calories	16 years 40 calories
Krogh's modification	Calories per sq. meter hour.	15 years 39.5 calories	16 years 38.3 calories
Benedict-Talbot	Calories per kilo body weight.	15 years 51.7 calories	16 years 52.5 calories
Bedale McLeod	Calories per sq. meter hour.	15 years 38.34 calories	16 years 36.96 calories
Bailey	Calories per sq. meter hour.	15 years 42 calories	16 years 41 calories

Etiology

The factors contributing to the etiology of hyperthyroidism in children have been attributed to (1) the administration of iodine for prophylactic measures, (2) focal infection, and (3) heredity.

Symptoms

The cardinal symptoms of hyperthyroidism in children are in general similar to those in adults. There are, however, some interesting and *distinct differences*. The uncommon nervousness and irritability noticed first by the parents usually marks the onset of this disease in children. (1) Exophthalmus and (2) enlargement of the neck occur somewhat earlier than in adults. This may be attributed to the shorter duration of the disease in children. (3) Tachycardia and palpitation are present as in adults but the secondary symptoms such as dyspnea, edema and arrhythmia seldom if ever occur in children. (4) Gastro-intestinal disturbances such as vomiting and diarrhea are more common in children than in adults, while the (5) tremor and (6) loss of weight occurring in the adult is seldom observed in the child. As contrasted with the mental confusion which exists in the severe cases in adults, the (7) mentality remains remarkably clear in the severe cases in the child. Two of our cases illustrated this point very well. Considerable difference of opinion exists as to what may be considered the normal (8) basal metabolic rate in children. DuBois states that the question is not settled. He points out that the variations in the findings of competent observers are very uncertain, especially in the excitable hyperthyroid child.

Table I shows the rather constant findings by the various methods of examination in the adult. Table II illustrates the marked variation in the basal metabolic reading after computation by the various methods of examination for the child.

Treatment

The medical treatment employed in the case of hyperthyroidism in children is relatively the same as that used in the adult. Preliminary hospitalization is more desirable in the child than in the adult. Ten drops of Lugol's solution three times a day is given for a variable length of time depending upon the individual severity of the case and the response to medication. One week is sufficient in the average case. Gaining of weight and slowing of the pulse are the main factors in the selection of the time for operation. Medication is always employed only as a pre-operative measure.

The graded surgical procedures are still useful in children in spite of the advantages gained by the use of Lugol's solution. Because of the marked tendency for growth and hyperplasia of the residual stump, subtotal resection of the thyroid should be equally radical as that in adults. An effective sedative the night previous to the operation, as well as the following morning preceding the operation, is advantageous. The anesthetic should always be general, preferably ethylene or nitrous oxide gas.

The meeting adjourned.

R. T. LaVake, M.D., *Secretary.*

TRANSACTIONS *of the* MINNEAPOLIS SURGICAL SOCIETY

Meeting of October 18, 1934
The President, Dr. Martin Nordland, in the Chair

INGESTED FOREIGN BODIES IN THE GASTRO-INTESTINAL TRACT REQUIRING SURGICAL REMOVAL

George D. Eitel, M.D., F.A.C.S.

The presence of foreign bodies in the gastro-intestinal tract, while always of interest, is by no means uncommon. They are found in individuals of all ages and are either ingested accidentally or deliberately. Deliberate ingestion may result from an act of insanity, a dare, a habit or medicinal therapy. Accidental swallowing of foreign bodies is therefore the most common.

The purpose of this paper is to point out the locations in the gastro-intestinal tract where foreign bodies are most likely to become lodged, depending on the type of foreign body present. It is also my purpose to outline the treatment when surgical removal is indicated. During the course of the paper I will present three cases which Dr. Wilcox and I have recently had, in which surgical removal was instituted, as well as cite other illustrative cases which have appeared in the literature relative to the subject under discussion.

The literature is filled with reports of every known object that has found its way into the gastro-intestinal tract that has either become lodged in the esophagus, or if able to reach the stomach has then been passed on to be expelled per anum with the patient remaining none the worse for the experience.

How are we to know that a foreign body is present? If the patient is an adult we are usually able to get the information as to the foreign body that has been ingested. In babies and children the mother is only aware of the accident because of a choking spell or because a pin or small object which served as a plaything is missing. Other cases are never suspected until the foreign body becomes lodged and causes either a gastro-intestinal irritation manifested by diarrhea and pain, a partial obstruction or a complete obstruction. An x-ray plate will always show those objects which are opaque. If the object is non-opaque it is often necessary to administer a small amount of barium which will coat the object and show its location and size. Many foreign bodies are ingested by children and the condition never diagnosed.

By means of the x-ray we are usually able to tell what object has been swallowed. This will enable us to tell what course we are to follow and what dangers are apt to confront us. The ordinary small objects such as coins, closed safety pins, fruit stones, rings, screws, tacks, thimbles and keys, we know will always pass through. The object is usually passed and recovered in the stool in from two hours to four weeks. It is now the general opinion that the majority of foreign bodies that enter the stomach spontaneously will also pass spontaneously through the pylorus and intestinal canal.

There are other foreign bodies such as open safety pins, needles, nails, long pins, hair and bobette pins, crochet hooks, screw drivers, pencils, medicine droppers, enteroliths and hair balls, that become lodged either because they are unable to negotiate the fixed turns or become impacted in a narrowed portion of the intestinal tract.

Dr. Habbe, a roentgenologist from Milwaukee, reports having watched the progress of a double edged Gillette razor blade pass through the entire gastro-intestinal tract without causing symptoms or discomfort. It was finally removed from the rectum by means of a proctoscope.

Dr. Paul F. Eve of Philadelphia in 1857 collected from different sources fifty instances of swallowed foreign bodies in which thirty-five patients recovered and fifteen died. Some of the swallowed substances were expelled without causing obstruction, while others after obstructing certain parts of the alimentary canal were expelled spontaneously, extracted artificially, or remained fixed in the body to cause death.

The points in the gastro-intestinal tract which are most likely to cause a delay in the passing of a foreign body are:

1. The pharyngeal and cardiac areas of the esophagus.
2. The stomach.
3. The junction of the second and third portions of the duodenum.
4. The terminal portion of the ileum.
5. Meckel's diverticulum if present (occurs in 2 per cent of normal individuals).
6. The ileo-cecal region because of the angular insertion of the ileum.
7. The lumen of the appendix.
8. Diverticulum of the esophagus and jejunum, sacculations of the large bowel, annular carcinoma, tuberculosis or any other factor causing a chronic obstruction.
9. Flexures and haustra of large intestine and rectum.

Being aware of these locations, what then is the procedure to follow in cases of foreign bodies? The patient should be advised to eat regularly and include in his diet food which leaves a residue, such as cereals, bread, mashed potatoes and bananas, to surround the foreign body with a protective coating and allow for more residue in the stool. Carthartics should never be administered because the powerful intestinal contractions may drive the foreign body into or through the intestinal wall. There should be repeated x-ray examination to determine the progress if the foreign body is one in which one might expect lodgment. When after repeated x-ray examinations the foreign body remains in the same position, surgical intervention should be considered. Other indications for surgical intervention are abdominal pain, tenderness, rigidity, distention with signs of obstruction, or the passage of mucus and blood.

Foreign Bodies in the Esophagus.—The narrowed pharyngeal and cardiac areas of the esophagus predispose to lodgment. Large coins, needles, bones, and partial dental plates are the most frequent foreign bodies which become lodged in this area. Treatment, whether or not it is surgical, is always directed toward the relief of obstruction. With regard to impacted foreign bodies it is noticed that their removal has passed largely from the domain of operative surgery since the advent of the esophagoscope. However, in the days before the x-ray and esophagoscopy the literature contains numerous accounts of cervical esophagotomy for the removal of impacted foreign bodies. Goursauld in 1738 appears to have been the first surgeon to perform this operation. In 1868 Cheever reported two successful cases and reviewed twenty-three cases of esophagotomy up to that time.

The following is the report of a case of a woman, aged twenty-seven, who consulted Dr. George G. Eitel, in 1892. Her history was that six years and four months previously she had swallowed a large part of her upper denture which she had broken the day before. At the time it gave her no discomfort so she paid little attention to it and did not mention the circumstances to anyone. One year later when eating hurriedly and swallowing a piece of beef that had not been properly masticated, she discovered that it would not pass on into the stomach and was regurgitated. From this time on she noticed obstruction. She consulted a physician, who advised it be left alone. Subsequently the obstruction progressed so that only liquids would pass and these finally would require many hours to pass through from the reservoir which was formed above.

Examination revealed an extremely emaciated patient with dyspnea and cyanosis. An esophageal sound revealed the obstruction two inches below the upper border of the sternum. The obstruction being located, an external esophagotomy was advised and performed the following day at Northwestern Hospital. (Dr. Eitel often told me about this case and said it was the first operation that he performed after locating in Minneapolis, which was in July 1892.) The plate was removed with difficulty and the stricture dilated with a small uterine sound until it was of sufficient size to permit passage of a stomach tube. The wound was left open to heal by granulation. The esophagus was dilated once a week for two months, during which time the patient was able to eat and regain her strength.

At the present time cervical esophagotomy may still be indicated in foreign bodies which have perforated the esophagus causing a peri-esophageal abscess.

Foreign Bodies in the Stomach.—Most foreign bodies which reach the stomach pass through the pylorus spontaneously. Those requiring operation are usually classed as bezoars and long objects which we know will not be able to pass the fixed turns. Some of these objects may be removed by means of gastroscopy. In 1502 Florian Mathias of Brandenburg performed the first successful gastrotomy for the removal of a knife nine inches long which had lodged in the stomach seven weeks. The patient recovered. The second recorded case was by Schwaben of Koenigsberg, who in 1635 extracted a knife ten inches long by gastrotomy. The first case of bezoar was reported by Baudamant of Paris in 1779 and the first successful gastrotomy for the removal of a hair ball was performed in 1883 by Schoenboin of Koenigsberg.

There are three types of bezoars. The trichobezoar is the most common and is made up of hair. These vary greatly in size. Bennett, of Peter Bent Brigham Hospital, in February 1934, reported the removal of one weighing almost four pounds. The second group, or phytobezoars, are composed of vegetable matter such as skins, seeds, and the fibers of fruits and vegetables. The persimmon bezoars found in people in the southern part of the United States are the most common. To date there are only eighteen cases reported in the literature, the first of which was reported in 1894 by Outten of St. Louis. These bezoars are irregularly spherical in shape and of dark brown or black color and average five by six centimeters in size. Concretions form the third group of bezoars and are usually composed of shellac and occur in painters and employees of furniture factories who drink furniture polish.

Dr. Lipschultz, roentgenologist at the Minneapolis General Hospital, recently reported a case of a trichobezoar in a girl, aged sixteen, who was admitted to the hospital for the diagnosis and treatment of a large palpable tumor occupying the upper abdomen which she had noticed only one week previous to admission. She also had a history of crampy pains and vomiting. Fluoroscopic barium x-ray examination of the stomach was done and revealed the tumor mass and a normal stomach mucosa. An x-ray diagnosis of the trichobezoar was made, after which time the girl admitted pulling out her hair and swallowing it. Dr. Moren operated upon this patient and removed a ball of hair, weighing 480 grams.

This case was the only one in a ten year period at the Minneapolis General Hospital necessitating operative intervention for the removal of a foreign body in the gastro-intestinal tract. During this period there were twenty cases where the objects passed through without surgical intervention.

Foreign Bodies in the Duodenum.—The duodenum is the most fixed portion of the gastro-intestinal tract and in all is about ten inches in length. It is divided into four parts, of which the first is about two inches long, runs back, up, and to the right, under the quadrate lobe of the liver; the second descends for about three inches along the right edge of the head of the pancreas to the level of the lower border of the third lumbar vertebra; the third passes to the left horizontally 2.5 inches, which brings it to the middle of the vertebral column, where it is crossed by the superior mesenteric vessels; and the fourth ascends on the left of the column and ends in the jejunum. The second, third, and fourth parts are retroperitoneal and have very little mobility. The junction of the second and third portions is a fixed turn at almost right angles and it is at this point that long or pointed objects have difficulty in passing.

The following is a case of a foreign body in the form of a four inch medicine dropper which after remaining in the stomach for about five weeks began its way

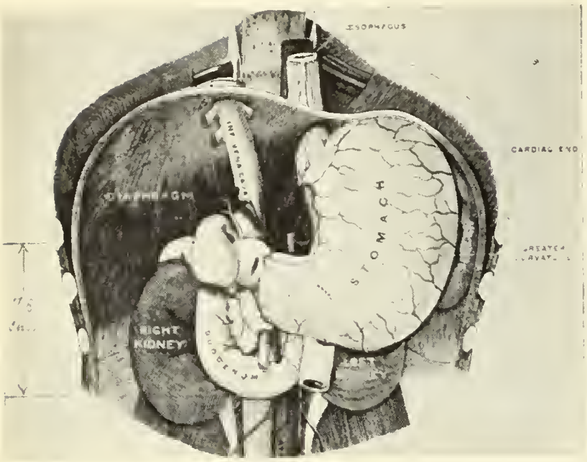


Fig. 1. Anatomical relations of duodenum showing length of second portion and showing junction of second and third portions.

through the duodenum, became lodged, and caused a perforation which required surgical removal and closure. Dr. Wilcox and I first saw the patient at our office on June 7, 1934.

The patient was a young lady, aged sixteen, with a history of having accidentally swallowed a medicine dropper about five weeks previously. She had used the rubber end of the dropper to irritate her palate in order to induce vomiting and in doing so suddenly gasped or gagged and swallowed it. The medicine dropper had been observed repeatedly by x-ray up to June 1, and was always in various positions in the stomach. The patient had no symptoms and was unaware of its presence.

X-rays taken June 7, at our office, showed the medicine dropper present in the second portion of the duodenum with the rubber bulb pointing upward and slightly medially and with the glass nozzle pointing downwardly.

With these findings we felt it was beginning to pass through and advised that she eat a meal of bananas in the evening to give the dropper enough bulk to carry it along. On June 8, she came in saying she did not feel so well and that she had vomited the bananas the evening before. She complained of slight pain in the right upper quadrant and said she was nauseated.

Fluoroscopic x-ray examination showed the dropper in the second portion of the duodenum with the appearance of a perforation of the duodenum at the juncture of the second and third portions with the glass end extending outside the lumen about one and one-half inches. Barium was given by mouth and showed the contour of the duodenum and dropper with a moderate dilatation of the duodenal loop indicating temporary stasis and tendency towards slight obstruction. The patient's temperature was 99 degrees and her leukocyte count 16,700. Immediate operation was advised and the patient was transferred to St. Barnabas Hospital by ambulance and operated upon.

Under ether anesthesia a right rectus incision was made. There was no free fluid on opening the peritoneal cavity. Palpation of the duodenal area soon located the point or free end of the dropper pointing downward to the right of and parallel to the spine and pushing before it the transverse mesocolon. The transverse mesocolon was then opened and the lesser peritoneal cavity observed, which contained no free fluid or exudate. The end of the dropper was in the retroperitoneal space so an incision was made over the posterior peritoneum. The glass end presented itself and slight traction was applied. Because of its conical shape the opening in the duodenum was progressively plugged so that no duodenal contents escaped. Steady traction was applied until the hub and rubber bulb were flush with the duodenal mucosa. It then became apparent that pulling more on the medicine dropper might dislodge the rubber bulb, causing the duodenum to retract into an inaccessible position. Therefore, with moderate tension traction on the dropper, using it as a retractor, a purse string dulox suture was inserted. This enabled firm fixation of the duodenum. Then a slight nick in the duodenum was made beside the glass barrel and the entire medicine dropper with the rubber bulb was removed. Adequate control of the duodenum was continued by tension on the purse string suture. About three or four cubic centimeters of bile escaped when the bulb was removed. The purse string was tied and a few Lambert sutures closed the duodenal defect effectively. A small Penrose tube was placed adjacent to this area and the posterior peritoneum was closed. The abdomen was then closed.

The postoperative treatment consisted of hypodermoclysis of normal saline and proctoclysis in addition to nasal suction. After the first day, the nasal tube was clamped off every two hours, enabling patient to retain fluids by mouth. Patient retained fluids well with no nausea or vomiting so the tube was removed on the night of the fourth day. The Penrose tube was removed the seventh day and the patient left the hospital the twelfth day after having a very normal convalescence.

The point where the medicine dropper lodged and caused a perforation is the most usual point of obstruction for a foreign body of four inches in length. If it had progressed with the rubber part of the medicine dropper first it no doubt would have negotiated the fixed curve.

Fisher, in 1919, reported three cases of foreign bodies lodged in the second portion of the duodenum which required removal. Duodenotomy was performed for the removal of a hair pin, small screw driver, and a bar pin. They were in children aged three years, fifteen and one-half months, and thirteen months respectively, and all made uneventful recoveries.

In February 1934, Shallow reported the case of a nine months old child, in which the point of an open safety pin caught in the wall of the duodenum at the juncture of the second and third portions. With manipulation he pushed it into the second portion of the duodenum and performed duodenotomy.

He also reports the removal of a nail from the duodenum in a child of three years of age which had been present three and one-half months. At operation it was manipulated to the second portion of the duodenum and removed.

He reports a third case of a bobette pin which was lodged in the second portion of the duodenum in a child of two and a half. At operation the pin was palpated through the wall of the duodenum, but on examination a fistulous tract was found between the duodenum and the transverse colon from which it was removed and the fistulous tract closed.

Another case is that of a child, thirteen months, with an open safety pin lodged in the duodenum.

These cases of Dr. Shallow's came under his observation during a ten year period ending January 1933, in conjunction with Dr. Chevalier Jackson's bronchoscopic clinic at the Jefferson Hospital in Philadelphia. During this period, 834 cases of foreign bodies in the in-

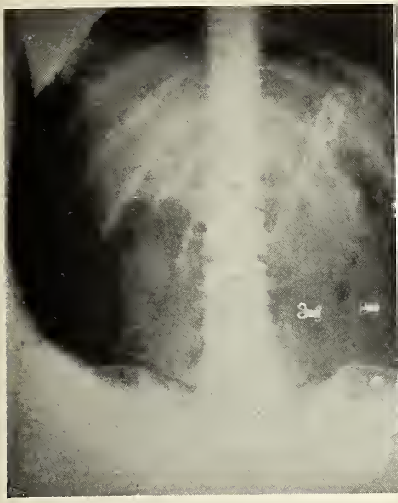


Fig. 2. Medicine dropper in stomach.

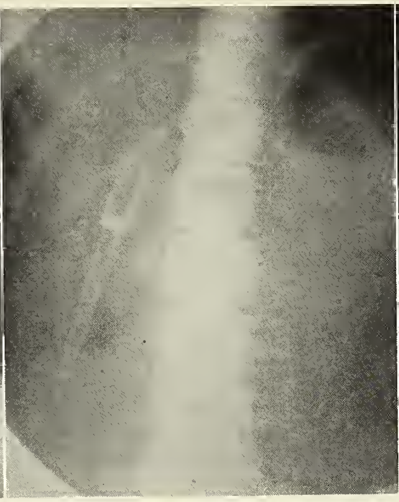


Fig. 3. Medicine dropper entering duodenum on June 7.

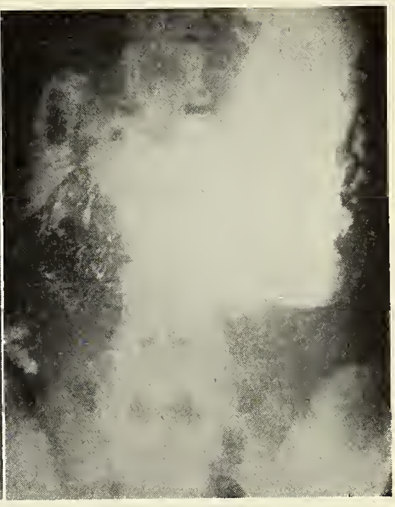


Fig. 4. Barium in stomach and duodenum with perforation of duodenum at juncture of second and third portions. The glass barrel can be seen outside the duodenum. Taken June 8.

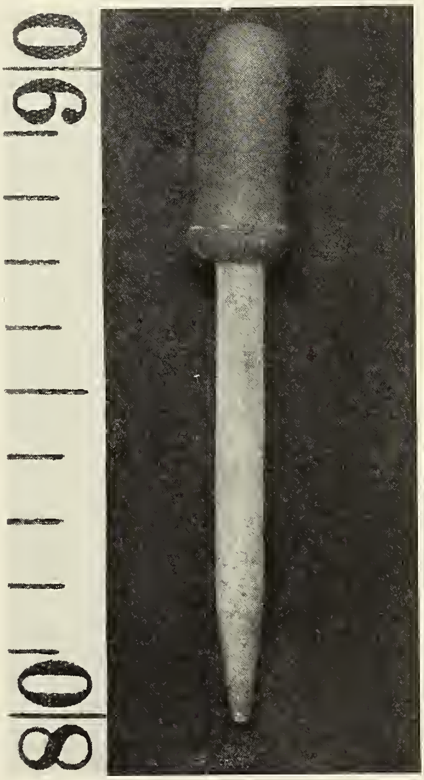


Fig. 5. Medicine dropper removed.

testinal tract were admitted to the Clinic; 821 passed spontaneously; of the remaining thirteen, twelve were removed by laparotomy and one from the sigmoid by means of endoscopy.

In 1928, Dr. Habbe reported a case of a two inch nail in a five year old child. It became impacted in the duodeno-jejunal angle, where it remained for three weeks. There were no symptoms, but because no progress was made and because the point of the nail was down, a laparotomy was performed. The nail was palpated and milked around the duodeno-jejunal flexure into the upper jejunum, where a small opening was made and the nail removed.

None of the above cases were complicated with perforation of the duodenum.

Foreign Bodies in the Jejunum and Ileum.—Objects that pass the duodeno-jejunal flexure are apt to cause symptoms as they reach the terminal ileum. This can easily be explained because the normal physiological lumen of the beginning of the small intestine may be as much as two inches in width. It gradually narrows down and may be only one inch at its lower end.

The most common foreign bodies causing obstruction here are due to enteroliths, of which there are at least five varieties:

1. Those with gallstones as nuclei.
2. Those composed of fecal material.
3. Those composed of vegetable substances or hair.
4. Those composed largely of swallowed medicinal agents or food.
5. Those with foreign bodies as nuclei.

These may all start their journey as small objects but, as they slowly proceed, increase in size and become lodged in the narrowed portion of the intestine, causing either a partial or a complete obstruction.

Gallstones which have gained entrance to the small intestine by either a cysto-duodenal fistula or by way of a dilated common duct, may require operation. The stone may obstruct the duodenum, the jejunum, the ileum or the sigmoid flexure of the colon. The high obstruction is usually caused by the larger stones.

Courvoisier, in 1890, collected 131 cases of obstruction due to gallstones. In a study of 3,064 cases of intestinal obstruction in 1925, only twenty-eight were due to gallstones, or .9 per cent (Coldren). The cases reported usually occurred between the ages of 50 and 70 years and was more common in women.

The symptoms are varied, depending on where the stone becomes impacted. A history of previous attacks of gallstone colic may be obtained. The stone generally makes its way through the wall of the gallbladder directly into the duodenum; hence there is no interference with the passage of bile and as a rule no cholangitis is present. The onset is usually sudden with vomiting, the severity of which depends on how high the obstruction is. If the obstruction is only partial the symptoms are less severe and distention is absent. At times, in flaccid abdomens a small tumor mass is palpable and is found to be in various positions due to the mobility of the small intestine. Many stones are able to pass through and after several attacks of partial obstruction are found in the stool. Unusually large gallstones have reached the terminal ileum before incarceration. Rankin reported one measuring 6.9 by 8.5 cm. Bennett removed one at operation with the greatest circumference of 5.5 inches and weighing 41.3 grams. Coldren reported one 1 by 2 inches in diameter, which passed after severe obstructive symptoms for one week with recovery.

X-ray of the abdomen may show the stone and if obstruction is present would show the dilated loops of small intestine above.

The treatment must always be surgical and must be done for the relief of obstruction. Early operation should be done. It is advisable to push the impacted stone proximally if possible, and perform an enterotomy and an enterostomy. If the stone be firmly impacted it is best to exteriorize the loop of intestine by the Mikulicz method and later on reestablish continuity of the bowel. Even under the best conditions the mortality is high.

Swallowed hair has one of three courses to follow. First, it may pass through the gastro-intestinal tract, causing no symptoms; secondly, it may collect in the stomach forming a trichobezoar which must be ultimately removed; or thirdly, it may pass through the pylorus to become lodged in the small intestine.

The following is a report of a case of a girl, aged seven, whom I first saw on September 18, 1931. Her illness began September 17, with pain over the entire abdomen. Vomiting started during the night. Her temperature was 101 degrees at the onset. Her bowels were normal. On September 18, the pain was localized at the umbilicus and seemed to come every hour. There was no muscle spasm or distension. On entering the hospital two days after onset of symptoms her temperature was normal, pulse 100, and leukocyte count 7,000. An enema was given with fair results. The vomiting seemed to subside and the child rested fairly comfortably. The following morning the abdomen was soft but slight peritoneal irritation was present and in the afternoon the vomiting and pain recurred. At this time a hard mass was felt in the right lower quadrant about three inches in length and an inch in diameter. It was not especially tender, was symmetrical and disappeared while palpating it. A diagnosis of an acute abdomen was made and the child operated upon.

The past history of the child is unimportant except that during the past year her appetite had been very poor and she frequently complained of stomach pain and nausea. Ten days before admission she had a severe diarrhea with offensive stools accompanied by vomiting. She would frequently awake at night and vomit food and frothy material and then go back to sleep.

At operation we found a high obstruction in the jejunum with a greatly dilated bowel. An advanced peritonitis was present. The hair ball was removed by a longitudinal incision, thus relieving the obstruction and enterostomy done above. Following the operation her condition was poor and she died on the second postoperative day.

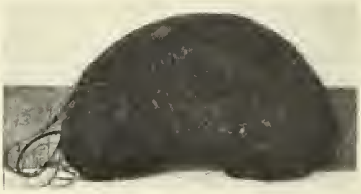


Fig. 6. Hairball removed from jejunum.

Following the operation the parents stated that the child had the habit of chewing and swallowing her hair. This began at the age of five when she started kindergarten and again at the age of six when she started school. At that time she had a bald spot on the right side of her head as a result. Her hair then was cut short and her parents thought she was cured. At the onset of school, just two weeks prior to her entrance to the hospital, she was very nervous and started the habit again. Her appetite had always been poor and she complained often of an upset stomach.

Mr. Charles Noon, in the *British Medical Journal,* March 1928, reports a similar case of intestinal obstruction caused by impacted hair balls in the terminal ileum.

Sherlitz of Berlin in 1930 reported a case of intestinal obstruction in a child of two years of age caused by an impacted ball of thread in the jejunum.

Intestinal obstruction caused by food lodged in the terminal ileum must also be considered. Dr. James Johnson, of this Society, operated upon a woman, aged 54, at the Abbott Hospital in 1928, for intestinal obstruction. The obstruction was found in the terminal ileum caused by a half dried peach which had swollen and became lodged. It was removed, an enterostomy done and the patient made a nice recovery.

Dr. Davis of Nashville, Tennessee, reported a case in 1931, of a physician's wife, aged fifty, whom he operated upon for intestinal obstruction caused by a solid mass of bran about the size of a hen's egg impacted in the terminal ileum.

Alvarez reported a similar case and warns against its use in the treatment of constipation as a means of adding roughage to the diet.

Obstruction of the lower ileum may also be caused by a mass of ascaroid worms impacted in this area. They should be removed by enterotomy. An enterostomy must also be performed through which any remaining worms may migrate. If this is not present they may go through the line of sutures causing a peritonitis.

Foreign Bodies in Meckel's Diverticulum.—Meckel's diverticulum, as a point of lodgment of foreign bodies, should always be remembered in every laparotomy performed for an acute abdomen. Perforation of a Meckel's diverticulum by a fish bone was reported by Dr. Roscoe Webb in the Annals of Surgery, July 1933. He was able to collect only six cases in the literature, one of which was our case which I would like to present in greater detail.

The patient was a man, aged seventy-one, who had just returned from a trip on southern seas. On April 8, 1932, he developed pain in the lower abdomen which was not sharply localized, some nausea, but no vomiting. The following morning his pain was more severe, was intermittent, and seemed to increase in frequency and was accompanied by rather severe diarrhea. When first seen his temperature was 98.4 degrees, pulse 78, and a leukocyte count of 13,600. This was forty-eight hours after the onset of symptoms. He entered the hospital with a diagnosis of probable acute appendicitis. The physical findings of rigidity and muscle spasm were absent. Rectal examination was also negative. Because of the continued pain an exploration was advised, but the patient requested further consultation. During the next three hours the pain seemed to shift rather quickly to different parts of the abdomen. At 9:00 p. m. on April 10. the pain became more severe and most marked in the right lower quadrant with definite increased muscular rigidity. A diagnosis of appendicitis was made.

The past history is essentially negative except for an ulcer history with a gastro-enterostomy done for the relief of duodenal ulcer in 1909 and an excision of the pyloric end of the stomach in 1925 for gastric ulcers.

We operated upon the patient at 11:00 p. m., under spinal anesthesia. A right rectus incision was made. No free fluid was noted upon opening the peritoneum. The appendix was easily exposed and appeared normal. It was, however, removed. The colon was then investigated and found negative with the exception of extensive adhesions resulting from previous operations. The ileum was about to be examined when the patient strained and a loop of ileum presented itself in the operative field, exhibiting a small broad based Meckel's diverticulum, the apex of which was whitened and through this area a fishbone protruded into the free peritoneal cavity, to the extent of a quarter of an inch. The pathological problem having been solved the fish bone was removed, and the perforation with surrounding necrotic area invaginated with a purse string suture and reinforced with several Lembert sutures. The abdomen was then closed without drainage. Convalescence was uneventful.

Dr. Webb's patient was a girl, fifteen years of age. In his case the diverticulum was about the size of the thumb of a rubber glove, so was removed entirely and the stump invaginated.

Faber, of Berlin, in 1898, did some interesting experimental work with fishbones and gave food with fish bones to adults, some of whom had a normal gastric acidity or hyperacidity and some of whom had a subnormal acid gastric content. In the former group the feces showed no fishbones, while they were present in the latter. He infers that in the first instance normal decalcification could take place. I do not know whether that factor played a part in these cases.

Fontaine and Bauer reported a case of a pin lodged in Meckel's diverticulum which was removed before it had perforated. Hauke recorded a case of the small biliary calculi in a Meckel's diverticulum causing suppuration and Davis reported a case which he operated upon with a diagnosis of acute appendicitis which proved to be an acutely inflamed diverticulum containing a toothpick.

With these cases in mind a surgeon should always carefully explore the terminal ileum for the possibility of a Meckel's diverticulum, which is present in about 2 per cent of people and if found should be resected.

Foreign Bodies in the Appendix.—Foreign bodies in the appendix have always been regarded as one of the causes of acute appendicitis. This was due to the various forms that fecal matter would assume when lodged in the appendix. These bodies are most often called cherry stones, grape seeds, date stones, lemon and orange pits, and children of today are still being warned not to swallow any of the above because of the danger of appendicitis.

It is true, however, that actual ingested foreign bodies may find their way into the appendix and cause inflammatory changes. Mestivier in 1759 recorded the earliest authentic record of an appendicular lesion produced by a pin which perforated the tip of the appendix causing an abscess. The patient died and at autopsy the pin was found. Cases are recorded of a bone, a toothbrush bristle, a wisp of broom, a piece of corn-husk, and a fishbone being found in acutely inflamed appendices. During the pheasant and duck season, shot, undoubtedly, are ingested with the meat and find their way to the lumen of the appendix. They may never cause trouble, but are found either in a routine fluoroscopy or in the appendix at operation.

Nutting of Washington, D. C., reported a case in 1932 in which he utilized the appendix in facilitating the removal of a clinical thermometer which had been swallowed and apparently lodged in the cecum. At operation the thermometer was milked into the appendix after the meso-appendix had been cut, and appendectomy performed. Stangl reports a similar case where a nail was removed in the same manner. Both these objects usually do not require surgical removal if given time to pass through.

Foreign Bodies of the Large Intestine.—One might think that if a foreign body reaches the cecum it would certainly be able to pass through the colon and rectum without further trouble. This is not the case for there is actually more danger of a perforation by a sharp object here than in the small intestine because the wider caliber of the bowel allows the object to turn on itself and in doing so might become impacted in the transverse diameter. In this fixed position the peristaltic action would be increased, and a pressure necrosis might be produced in addition to a local inflammatory process. In the small intestine the narrower lumen makes it difficult for a foreign body to turn around and its slow vermicular action makes lodgment or perforation unlikely.

As a result of a perforation we may find a peritonitis, peritoneal abscess, or fistulous communication between intestine and intestine, or between intestine and some other organ, such as the bladder. Anatomical or pathological conditions such as sacculations of the large bowel, annular carcinoma, or tuberculosis would predispose to an obstruction caused by a foreign body.

We recently operated upon a man, aged seventy-four, who came in with a bowel obstruction which had come on suddenly. Colon x-ray revealed an obstruction in the splenic flexure due to carcinoma. This was confirmed at operation and showed the narrowed lumen obstructed by an impacted watermelon seed.

Many other objects after traversing the gastro-intestinal tract become lodged in the rectum and must be removed manually or by means of a proctoscope.

Genglaire reported a case in which the patient swallowed thirty frogs and had no symptoms until they reached the rectum. A large mass of tangled frog bones was extricated manually.

Foreign bodies are also inserted into the lower reaches of the intestinal canal through the anus, but such cases are beyond the province of this paper.

Conclusions

1. Most foreign bodies of the intestine are ingested accidentally and in the majority of cases are evacuated spontaneously.
2. Certain foreign bodies have a predilection for lodging in either the junction of the second and third portions of the duodenum or in the terminal ileum.
3. The objects which are of such a nature that might become lodged should be carefully studied clinically and by the x-ray.
4. All obscure acute abdomens should be x-rayed with the possibility in mind that a foreign body might have been ingested and lodged.
5. If there are signs of lodgment with clinical and x-ray findings immediate operation should be instituted.

Discussion

Dr. Kenneth Phelps: After hearing part of this paper I am sure there is very little to say from the point of view of the surgeon. However, there is another point of view which I could perhaps bring out and that is the point of view of the man who wields the esophagoscope. I brought down a few slides which will bring out the points I wish to make better than any other way. I will not take very much time as the subject has already been so thoroughly discussed.

The first place in the gastro-intestinal tract we find foreign bodies lodged is, as Dr. Eitel has mentioned, in the esophagus. I went over my cases this afternoon from a standpoint of frequency of lodgment in the esophagus or in the air passages, and I find that in my group of adult cases, 115 were lodged in the esophagus and fifteen only in the air passages. That means that in adults approximately 10 per cent of foreign bodies were in the air passages, the other 90 per cent in the food passages.

The types of foreign bodies are related to food or eating. Usually the adult foreign body patient has false teeth or very poor teeth. They are eating, do not masticate properly, or due to dental plates do not feel the foreign body in their mouth. In children, as a rule, the case is just the opposite. Children comparatively rarely get foreign objects in their throats while eating. Children's food is watched, carefully prepared and they are fed usually by a nurse or the mother, so they do not have this accident happen as a result of eating. With a child, most foreign bodies lodged in the esophagus or windpipe are the result of accident, something picked up off the floor or eaten between meals. In children the most common site of a foreign body is in the air passage, shown in my group of cases by 140 in the air passages to 100 in the esophagus.

Very rarely is it necessary to open the esophagus in order to get a foreign body out. Usually an external operation is done when the foreign body has already perforated, a bone or pin which has gone through the esophagus, and caused an infection in the peri-esophageal tissue in the neck or mediastinum.

Foreign bodies in the stomach cause symptoms only when they obstruct the pylorus or prop it open (as a safety pin might). Needles are more liable to perforate than common pins. When there is a foreign body in the stomach we want to know: (1) can it get through the pylorus? (2) If so, is it liable to cause trouble in the intestines? As a rule, any object which will go through the cardia will pass through the pylorus, but something pushed through the cardia may not go through the pylorus. A long object may not be able to make the turns of the duodenum. An object 5 cm. long is the largest a child of two years can pass. A full length pencil has been known to pass, but it should not be allowed to do so. Removal by use of the gastroscope is safe and should be advised for all safety pins and other objects which might perforate.

Foreign bodies in the intestines seen to remain lodged in one spot for four days should be removed. Perforation occurs more frequently from ulceration than from direct puncture. No cathartics, other medications, nor changes in diet should be prescribed for fear of setting up increased peristalsis. Objects like safety-pins go through with the safe end first and the point trailing. As a rule small safety pins and fairly large safety pins will go through. The medium sized safety pins are the ones most likely to cause perforation.

By means of a gastroscope we can see probably two-thirds to three-fourths of the stomach (of course we have to use the open one) and by external manipulation, under fluoroscopic control, ordinarily we can get any object, even one that is in the pylorus, into line with our tube and remove it. For purposes of examination with the closed tube with a lens system we can see the entire stomach, but of course, we cannot operate through this instrument. (Slides shown.)

Dr. A. E. Wilcox: First I want to congratulate Dr. Eitel on his excellent presentation of this subject. He has some very pretty cases and presented them in a delightful and instructive manner. His paper will become a permanent part of the literature and serve as a splendid reference. All the cases that we had, as you may well know, are very interesting to us. I wish at this time also to thank Dr. Phelps for his interesting discussion and presentation of cases.

Of these cases that Dr. Eitel presented, I think the one where the patient swallowed the medicine dropper was the most interesting and proved to be rather dramatic. The purse string suture placed in the duodenum and which held the rubber bulb attached to the glass portion of the dropper was of inestimable value and proved to act as a good retractor in holding the duodenum from slipping into an inaccessible position during the removal of the foreign body.

I congratulate the Society in having this paper presented before this session.

Dr. S. R. Maxeiner: I would like to indorse what Dr. Wilcox has just said regarding the excellence of Dr. Eitel's paper. Dr. Eitel has presented his subject in a very learned and entertaining manner. I can personally recall seven cases which we have had.

Case 1.—This case was a patient in the practice of Dr. Farr. A man had an old-fashioned silver dollar in his hand and when his wife attempted to take it away from him he slipped it into his mouth. Knowing that he was ticklish, she gave him a nudge in the ribs and the patient swallowed the dollar. The dollar was removed by abdominal section. This case gave rise to many humorous remarks as to whether the patient was a dollar in or a dollar out. The dollar removed from the stomach constituted the sole fee collected by Dr. Farr.

Case 2.—The next case is one that ended in a malpractice suit against Dr. Farr. The man was eating some food which the wife had carefully prepared with an egg-beater and one of the wires which became detached from the egg-beater lodged in the patient's throat. The wire penetrated the cervical esophagus and when he came to Dr. Farr, the wire was penetrating deeply into the neck and was accompanied by a severe infection. The wire was removed through an external incision over the neck, and the deep tissues were drained. The patient subsequently developed a mediastinal abscess and was seen in consultation by Dr. Arnold Schwyzer. At the suggestion of Dr. Schwyzer, the incision was reopened and the superior mediastinum was drained. The patient made an uneventful recovery but had a paralysis of his recurrent laryngeal nerve which was the basis of the malpractice suit.

Case 3.—In another instance, a case of Dr. Farr's, a patient had an obstruction of the bowel due to a Murphy button. A segment of bowel containing the Murphy button had to be resected. This patient also made a normal recovery.

Case 4.—Two years ago we operated upon a patient with acute appendicitis, and when the appendix was opened it was found to contain bird shot. This is not an uncommon finding, and x-ray studies reveal bird shot in the appendix occasionally during the hunting season.

Case 5.—This man was referred to me with a pelvic abscess, the man having had a very acute attack of abdominal pain which in every way resembled appendicitis. A tentative diagnosis of pelvic abscess due to a ruptured appendix was made. However, upon opening the abdomen the appendix was found to be normal and when the abscess was opened a toothpick was found to be penetrating a diverticulum of the sigmoid. The patient made an uneventful recovery.

Case 6.—In this patient an exploratory operation revealed a perforating malignancy of the sigmoid, undoubtedly developing upon a diverticulum. The bowel had perforated and was walled off in the pelvis and contained a campaign button with a celluloid top. The spring pin which accompanies these buttons was not present but the celluloid, in a much degenerated condition, still encased the button. The foreign body was removed, the pelvis drained and the patient made an uneventful recovery, to be operated upon subsequently for a malignancy.

Case 7.—This patient had an intestinal obstruction as the result of a very large gallstone which evidently penetrated through a spontaneous anastomosis between the gallbladder and the intestine. This patient did not survive her operation.

Again I wish to congratulate Dr. Eitel on his very excellent presentation.

Dr. Iver Sivertsen: I would like to add one case which is interesting along the lines of intestinal obstruction, or foreign bodies in the intestine.

The case is that of a man who worked in a hardware store and sold window screens. It appears that frequently he placed a piece of the cut-off screen in his mouth and chewed it. During this process, he no doubt swallowed some of the small wires from the screen.

The patient was seen because of an intestinal obstruction and when he was operated upon we found that he had two areas of necrosis of the bowel, forty inches apart, the wire from the screen having penetrated the blood vessels in these areas and causing a thrombosis with a resultant necrosis. Therefore, there were two obstructed places. Because of these two different areas, it was deemed advisable to resect the bowel and forty inches of the bowel were removed.

The patient made an uneventful recovery even though the sterile nurse answered the telephone, handled the receiver, rinsed her hands in bichloride and came back into the field of operation.

Dr. James A. Johnson: I also want to congratulate Dr. Eitel on his very excellent presentation on this subject. It is one of the best papers I have heard read before this Society for some time. Foreign bodies in the gastro-intestinal tract have always excited a good deal of interest. I can recall in the early years from 1915 on, when I first came to the University, we had a great many cases of foreign bodies in the gastro-intestinal tract, particularly in children. We had two cases in which small children swallowed open safety pins and both of them passed without any difficulty. One child swallowed over a dozen small pins, all of which passed without any symptoms. I have had two children in private practice swallow open safety pins, both of which became impacted in the esophagus and had to be removed by Dr. Phelps through the scope. During the last fifteen years I have not seen so many cases. It is quite probable that there are not so many objects on the floor since the vacuum cleaner has become almost universal equipment in the home.

I have had several cases of gallstones which have obstructed the lower ileum. Fishbones often perforate the intestinal wall. I have seen three cases, one perforating the esophagus and two perforating the intestine. One had formed an abscess in the abdominal wall and a fishbone was removed from the abscess.

CASE REPORT: CONGENITAL OBSTRUCTION OF THE THIRD PORTION OF THE DUODENUM IN A TWO YEAR OLD BOY. OPERATION WITH RECOVERY.

E. A. Regnier, M.D.

I believe that the title of this report is probably incorrect but the case does not fit any diagnostic category. I thought that the case was of unusual interest. In going over the literature on the subject of duodenal obstructions I found nothing in the literature just like this case. There were innumerable articles, particularly in foreign literature, on obstruction of the duodenum due to congenital bands, aplasias, atresias and so-called traction of the mesenteric vessels over the third portion of the duodenum.

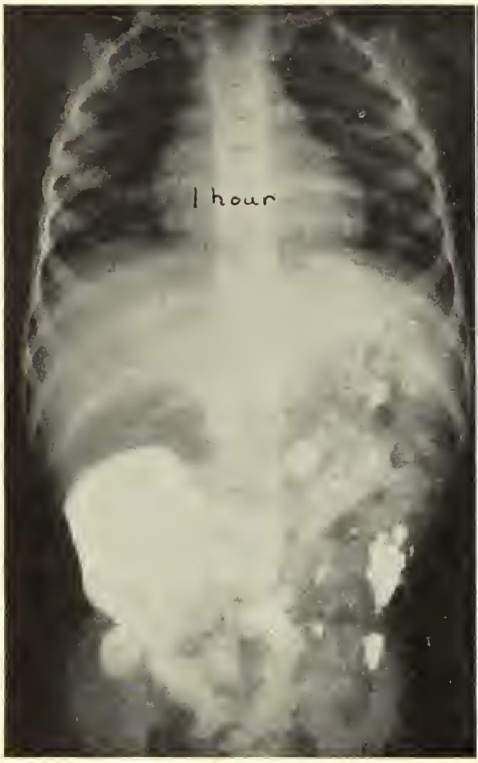


Fig. 1.

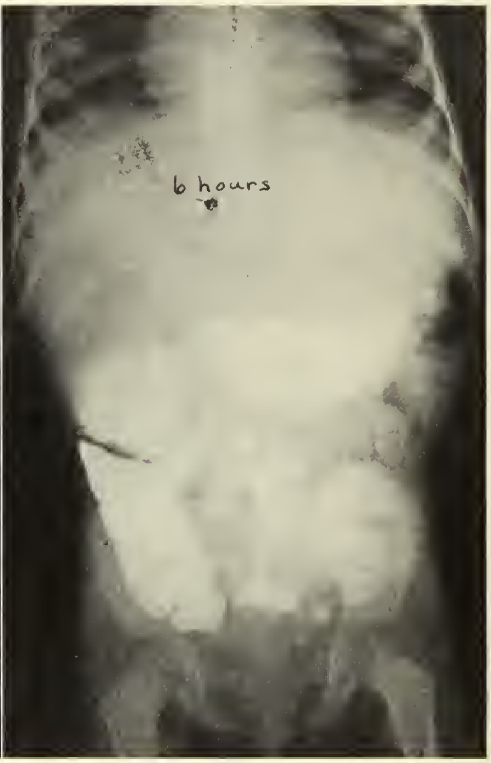


Fig. 2.

This is a case of a male child, two years old, whom I saw in consultation in March, 1934.

The history is that of a male child, normal at birth and during the first year of life. When about one year of age or coincident with the change of diet from semi-solids to solids and about the time the child began to walk, he developed projectile vomiting, distention of the upper abdomen and failure to gain in weight. There was no actual weight loss but a relative loss because during the period of his illness the child underwent physiological growth in stature. The child weighed twenty-one pounds at one year of age and at two years of age still weighed only twenty-one pounds. There was no complaint of pain or any apparent physical suffering. Vomiting would occur sometimes daily, sometimes every other day. The child would often regurgitate food ingested twenty-four hours previously. When put on a strictly liquid diet vomiting would be very infrequent. There was some constipation.

Physical findings were that of a child about two years of age with marked malnutrition. The only abnormal findings were the rather distended upper abdomen, tenderness in the right upper quadrant, and the possibility of a mass being felt in the right upper quadrant. The picture was obviously one of partial obstruction of the gastro-intestinal tract. A series of gastro-intestinal x-rays were taken and these showed a marked degree of obstruction which appeared to be at the duodeno-jejunal juncture. This was manifested by the tremendously dilated duodenum in the first, second and third portion. You will notice that the duodenum is equal in diameter to the greatest diameter of the stomach. After six hours there is about 60 per cent retention of barium in the stomach and duodenum. Dr. Ude read the films and diagnosed obstruction about at the ligament of Trietz.

At operation many mechanical difficulties were encountered because the stomach and duodenum filled two-thirds of the abdominal cavity. The third portion of the duodenum was at the level of the fifth lumbar vertebra. The dilated duodenum was traced to where it crossed the vertebral column. At this point it was directed posteriorly and seemed to entirely disappear. Upon tracing its path behind the mesentery of the bowel, the beginning of the jejunum was identified. The jejunum was about 2 cm. in diameter, the duodenum about 3 inches in diameter. There were no bands, no anomalous vessels, no anatomical structures to cause obstruction except for the narrow hiatus behind the mesentery. The only logical and mechanically possible procedure seemed to be a jejunoduodenostomy. This was done anastomosing the jejunum to the third portion of the duodenum through the transverse mesocolon.

During the first thirty-six hours postoperatively the child suffered some distention but this was controlled by continuous duodenal drainage. From that time on the child made an uneventful recovery. Subsequent x-ray films show normal emptying time of the stomach and the child gained in weight very rapidly and was completely relieved of the obstruction.

The only logical deduction that I can make as to the etiology of this obstruction is that it was due to the pressure of the mesentery plus a narrowed opening at the site where the duodenum crossed behind the mesentery. The origin is probably congenital. The change of posture and the change of diet unquestionably brought about the tremendous dilatation of the duodenum secondary to the narrowing of the lumen at the duodeno-jejunal juncture.

A series of x-ray films was shown.

CASE REPORT: HORSESHOE KIDNEY WITH COMPLICATIONS

Theodore H. Sweetser, M.D.

This man, fifty years old, was referred to me for urologic examination July 2, 1934, by Dr. A. L. Hamel, because he had found albumin and erythrocytes in a routine urinalysis. According to his history there had been a serious injury in an automobile accident fifteen years ago, necessitating laparotomy for an intestinal injury. About one year later pyuria had been discovered and a left nephrectomy had been at first advised. However, the pyuria disappeared after removal of an infected tooth and the patient was advised simply to have an annual physical examination including urinalysis.

During the intervening years he had had pains intermittently in the abdomen, especially just to the left of the umbilicus. The pains had been accentuated by walking and by stretching the arms above the head, and had been relieved by sitting or lying down. They had never radiated to the back. During the last three months the pains had been more severe and more frequent, and he had complained of weakness, tiredness, frequent urination and nocturia. There was no history of gastro-intestinal disturbance even on careful questioning. General physical examination disclosed nothing of importance; the patient being rather stout it is not surprising that no abdominal mass was felt. The urine showed albumin and a few leukocytes.

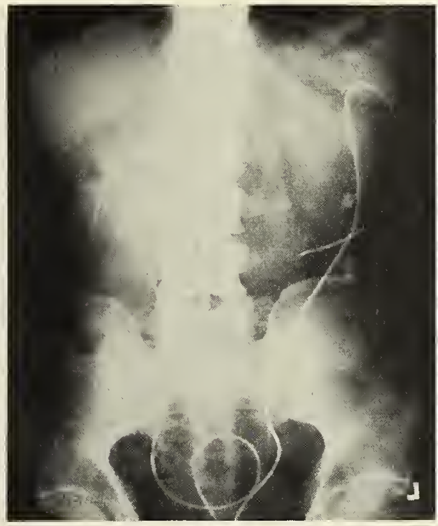


Fig. 1. X-ray showing catheters in ureters.

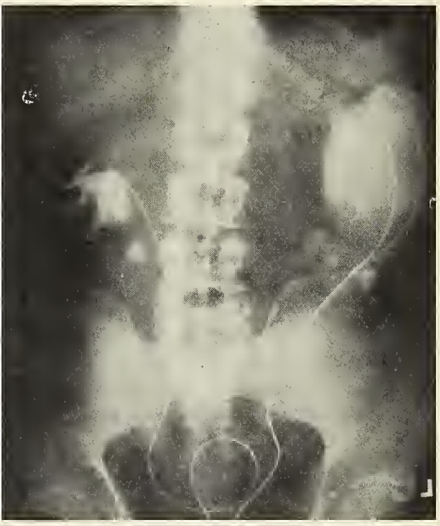


Fig. 2. Bilateral pyelograms.

At cystoscopy the bladder appeared to be normal. The ureteral catheters were passed easily to both renal pelves; a fairly large amount of fluid was aspirated from the left renal pelvis. Indigocarmine, injected intravenously, was recovered from the right catheter in five minutes, but from the left in only a trace after fifteen minutes. The plain roentgenogram with opaque catheters in place (Fig. 1) showed some enlargement of the left renal shadow with a suggestion that the lower pole might extend over the spine shadow; the left ureteral catheter was shown to extend in a large curve well beyond the renal shadow laterally, and then downward and medially, ending so low and so far medially as to show that the lower pole of the kidney must at least extend some distance toward the spine. The locations of the stone shadows are also worthy of notice. Close study of the bilateral pyelogram (Fig. 2) clinches the diagnosis: The lower calices of both kidneys extend much farther medially than any other parts, and close observation shows that one lower minor calyx on each side extends anterior to the spine itself; the main part of the left renal pelvis shadow is seen actually to extend farther laterally than the shadow of the renal cortex; the lower stone shadow, of dumb-bell shape, is just at the edge of the pyelogram, suggesting a partial perforation of the wall of the renal pelvis. The diagnosis then was: (1) horseshoe kidney with fusion of lower poles; (2) slight hydronephrosis of right side and severe hydronephrosis of the left side; (3) two calculi in the left renal pelvis (it should have been suspected that one of them perhaps partially perforated the wall of the pelvis). Left heminephrectomy (Figs. 3, 4, and 5) corroborated the above diagnosis. There were numerous fibrous bands in the perirenal fat, especially around the perforating stone. The renal pelvis contained fully 500 c.c. of slightly cloudy urine. The ureter passed anterior to the isthmus. The renal blood supply consisted of a number of entirely separate vessels to the upper and lower parts. The isthmus at the groove between the two halves was about 2x1 cm. in cross section; the minor calices of the left and right sides came within about 1 cm. of each other. The blood vessels supplying the isthmus came from above, below, and behind, allowing very little mobilization until they had been divided.

After a rather stormy convalescence the patient made a good recovery, and reports he feels well and has been completely relieved of his abdominal pains and his old constant tiredness.

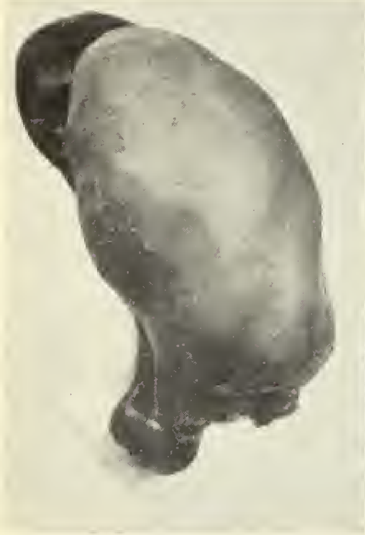


Fig. 3. Specimen viewed from front; pelvis filled with cotton.

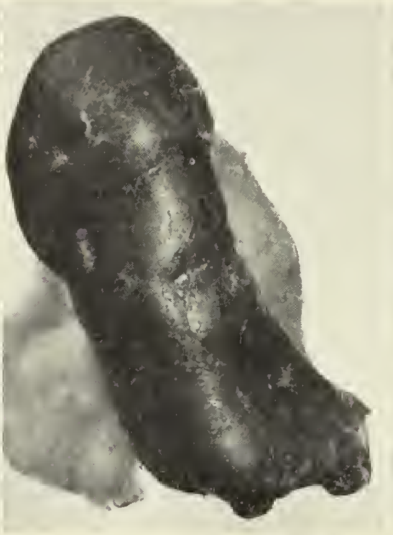


Fig. 4. View of specimen from rear. (Shadow in lower left corner is cotton.)

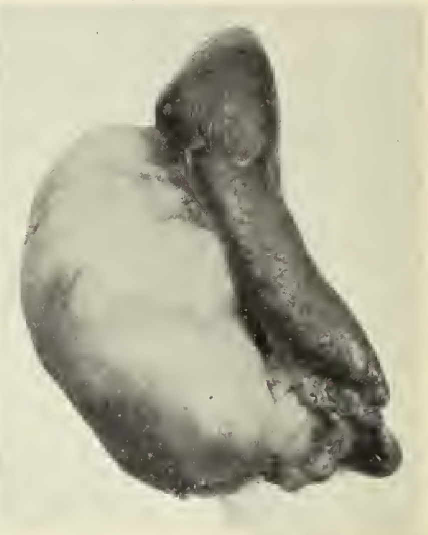


Fig. 5. Side view of specimen.

Horseshoe and other types of fused kidney were known centuries ago as rarities and later simply as curious anomalies. More recently, with more accurate means of study, they have been accurately diagnosed and sometimes treated with complete relief of distress. Most patients presenting themselves with horseshoe kidney come for relief of symptoms that may be ascribed mainly to complications, such as hydronephrosis, infection, or calculus, which are results of faulty drainage caused by the anomaly. This was true in our case, though one might ascribe to the anomaly itself the fact that the abdominal pain was accentuated by raising the arms above the head (pressure of the isthmus across the great vessels and nerve plexuses). Such a significant symptom was emphasized by Rovsing.

As is true of other lesions not frequently met, many patients with horseshoe kidney are treated off and on for years for various troubles, sometimes medically and sometimes surgically, without lasting relief. Systematic study and attention to details will usually reward the searcher. Roentgenography and particularly pyelography are the most enlightening steps in the study of the condition. The lower poles of the kidneys are found to be inclined toward instead of away from the midline and the shadow of the isthmus itself is sometimes discernible. There is also a fault in the rotation of the long axis of each kidney so that the calices point posteriorly or posteromedially instead of laterally. Moreover, the lower calyx can be traced into the isthmus, sometimes even over the margin of the spine. Braasch described that in general terms and Gutierrez has used it as a means of record in describing his "horseshoe kidney pyelographic triangle."

Treatment may be conservative or may have to be radical. In our case, we believe that anything short of left nephrectomy would have unjustifiably increased the risk and decreased the chance of cure of the symptoms. Any conservative treatment should (1) correct any disability of the affected side, and should also include (2) division of the isthmus to relieve the drag and pressure on vessels and nerve plexuses, and (3) placement and rotation of the kidneys into the normal lumbar positions in so far as is possible, with support there by nephropexy. This was advocated first, I think, by Edmund Papin of Paris, and recently also by Frederic E. B. Foley of St. Paul. However, in a series of twenty-five cases reported by Gutierrez, of which nineteen were diagnosed by urologic examination, the ones in which relief was obtained were those treated by heminephrectomy. Also, in a series of sixty-eight cases reported by Walters and Priestley of The Mayo Clinic, only one was an uncomplicated case treated by division of the isthmus, and in that case relief was only partial. In our case we expect to check the position and function of the remaining right kidney by intravenous pyelography after some months. If the right half of the isthmus receives blood vessels from all directions and in considerable number as did the left side, I doubt that the right kidney can be rotated and brought into the normal lumbar position; hence we will not advise any surgical interference unless some serious reason exists. It seems now that the simple division of the isthmus has sufficiently released the right kidney.

Dr. Martin Nordland reported a case of inoperable carcinoma of the right breast with presentation of the patient.

The case had been treated by three courses of deep x-ray therapy since July, 1934. Lantern slides were shown to demonstrate the progress of the treatment.

A report of the case with illustrations will be published at a later date.

Respectfully submitted,
F. A. Olson, M.D., *Secretary-Treasurer.*

THE ADMINISTRATION OF THYROXINE

There can no longer be doubt that thyroxine represents the effective iodine-containing hormone of the thyroid gland. One of the puzzling features of thyroxine from almost the outset of its discovery and isolation has been the repeated observation of the inefficacy or greatly lowered effectiveness of thyroxine when it is administered by mouth rather than intravenously. At first thought one would expect the purified hormone to be quite as potent as an equivalent amount of desiccated thyroid gland. According to observations at Rush Medical College in Chicago by Harington and Salter the physical properties of thyroxine are such as to make it highly probable that the absorption of this substance after oral administration would be inefficient and erratic; the digestion product, on the other hand, possessing as it does a much wider range of solubility, might well be absorbed almost quantitatively. The Chicago clinicians conclude that solubility of the thyroxine compound administered would therefore appear to be important and destruction by intestinal enzymes must be considered; but only future work will determine whether or not some other factor, as yet unknown, is also to be considered. (*Jour. A. M. A.*, December 2, 1933, p. 1805.)

ACCEPTANCE OF SUNLAMPS

During the past seven years the Council on Physical Therapy has devoted much time and effort to the question of ultraviolet radiation therapy, and in two preliminary statements gave its conclusions and its specifications for acceptance of "sunlamps." Sunlamps, so called, are not to be confused with therapeutic ultraviolet generators designed for service in hospitals, clinics and offices of physicians. Since sunlamps are for unsupervised home use, they are often of low intensity to avoid injury from overdosage. In accepting sunlamps, the Council on Physical Therapy calls the attention of the profession to the following: A. The Council on Physical Therapy definitely withholds acceptance of the postulatory principle of dual-purpose lighting, because it is highly theoretical and acceptable clinical evidence substantiating its therapeutic or prophylactic value has not been presented. B. The Council on Physical Therapy declines to accept sunlamps if the manufacturer fails to state in all advertising matter and descriptive literature the distance between the lamp and the recipient required to equal the intensity of midday, midsummer, midlatitude, sea level, natural sunlight. C. The manufacturers of acceptable sunlamps for home use have agreed to discontinue objectionable claims, such as that exposure to ultraviolet rays increases or improves the tone of the tissues or of the body as a whole, stimulates metabolism, acts as a tonic, increases mental activity, maintains health or tends to prevent colds, because these claims have not been conclusively substantiated by experimental evidence. D. Until further evidence is presented to prove otherwise, the Council declares that the erythema ble ultraviolet is emitted by the source. (*Jour. A. M. A.*, January 6, 1934, p. 42.)

MISCELLANEOUS

The War Against Tuberculosis*

The fight being carried on against tuberculosis is a genuine war of extermination and we can rightfully speak in military terms. There are no pacifists in this war although there may be a few slackers.

We are winning this war but this is no reason for stopping. To show some of the territory we have gained, I would like to point out that thirty-five years ago the death rate from tuberculosis, in the United States, was over 200 per 100,000 population. Today it is 60 and Minnesota is far below the average with a rate of approximately 38 deaths per 100,000. But even 60 makes an enormous figure. It means 75,000 deaths annually from this disease in our country. This is about 50 per cent more than the number of soldiers killed in action in the World War. Much has been said about war victims, but as a country we are quite apathetic over the death toll from tuberculosis. For every one wounded in the World War, we have at least two wounded by tuberculosis. In this situation it must be gratifying to you to know that no state in the country has a more forward-looking program of tuberculosis prevention than Minnesota.

At no time in this tuberculosis warfare have things been so favorable as now for eradication. The tuberculosis death rate used to be the important thing. Today we focus on the living cases and on the problem of potential cases. What we needed was some weapon to tell us where these cases were. If we left it to the tuberculosis patients to wait until symptoms appeared, we could not make progress. By the time the patient recognizes that there is something wrong, the disease is moderately or even far advanced. The time to start is before the patient is aware that he is sick. Tuberculin tests tell us how many in a group have been infected. When the tuberculin test is followed by x-ray examination of the positive reactors, that is, the ones who have been infected, all those diseased are easily found. In addition it enables us to find the source of infection. It is a benefit to the community because it shows who are the people that are sowing the infection.

The National Tuberculosis Association program is diversified. One phase is fundamental research on tuberculosis. It centers around the study of the actual nature of the germ causing the disease. This work must be done on a large scale. Probably 100 pounds of tubercle bacilli have been grown, an amount sufficient to infect five billion animals. It is like working with high explosives but these virulent germs are handled with greatest care in the laboratory. Through these methods it has been possible to develop the pure tuberculin in use today. While we obtained fine results with the old tuberculin, these results were not always uniform. By using this highly purified material, it is possible to compare results obtained in California with those in Maine, with confidence in the correctness of the figures.

---

*Abstract of talk given by Dr. Esmond R. Long, of Phipps Institute, at the annual dinner of the Minnesota Public Health Association, Friday, November 23, 1934, at Nicollet Hotel, Minneapolis.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

Books Received for Review

Body Mechanics. Joel E. Goldthwait, M.D., LL.D., et al. 281 pages. Illus. Price, cloth, $4.00. Philadelphia: J. B. Lippincott Company, 1934.

Treatment by Diet. Clifford J. Barborka, B.S., M.S., M.D., D.Sc., F.A.C.P. Department of Medicine, Northwestern University, Chicago. 615 pages. Price, cloth, $5.00. Philadelphia: J. B. Lippincott Co., 1934.

The 1934 Year Book of General Medicine. George F. Dick, M.D., et al. 843 pages. Illus. Price, cloth, $3.00. Chicago: Year Book Publishers, 1934.

Periodic Fertility and Sterility in Woman. Professor Herman Knaus, Head of the Clinic for Gynecology and Obstetrics of the German University of Prague. Authorized English Translation by D. H. Kitchin, and Kathleen Kitchin, M.Sc., M.B., B.S., London. 192 pages. Illus. Price, cloth, $6.00. Vienna: Wilhelm Maudrich, 1934.

System of Diet Writing. William S. Collens, B.S., M.D., Chief of Diabetic Clinic, Israel Zion Hospital, etc. Price, $5.00. New York: Form Publishing Company, 1934.

TEXTBOOK OF BACTERIOLOGY. Hans Zinsser, M.D., and Stanhope Bayne-Jones, M.D. Seventh Edition. 1226 pages. Illus. Price $8.00. New York and London: D. Appleton-Century Company, Inc., 1934.

The latest edition of this text maintains its excellent quality by summarizing the present knowledge of bacteriology in a judicious way. This attitude lends authority for the student and casual medical reader and for the bacteriologist leaves open the questions to be attacked by further research.

For instance, in the discussion of viruses and the filtrable forms of bacteria, while admitting a possible relationship, the authors are not convinced by any of the evidence presented to support the conception of viruses as having a bacterial origin; in fact, they regard this as highly improbable.

Complete perusal of the text has not been done.

C. A. McKinlay.

RULES FOR RECOVERY FROM PULMONARY TUBERCULOSIS. Lawrason Brown, M.D. Sixth edition. 275 pages. Price, $1.75. Philadelphia: Lea & Febiger, 1934.

Dr. Lawrason Brown, in his sixth edition of Rules for Recovery from Pulmonary Tuberculosis, has revised and enlarged his earlier publications. There is a wealth of detail valuable as a source of reference for the patient who is sincere in his desire for health. The entire book is written very simply and conveys the necessary information which might be too easily forgotten if the patient were to depend upon his memory.

Although he is specific in stating his rules and explaining the necessity of adhering to them, Dr. Brown realizes the danger of permitting a layman to depend solely on this source of information and recommends always that the patient be under the constant care of a physician.

It is to be noted that Dr. Brown advises the use of gauze to be held over the patient's mouth when he coughs. In this, many physicians will take issue with him, as it has been shown that paper napkins are much more sanitary.

Patients may be unnecessarily worried over their inability to meet the outdoor living requirements stated by Dr. Brown, but the patient's own physician will be able to give him the reassuring information needed to circumvent this.

On the whole, the book is very much worth while and contains a valuable bibliography for additional reading along the same line.

F. L. Jennings.

GYNECOLOGY. Brooke M. Anspach, M.D. Professor of Gynecology, Jefferson Medical College. 5th edition. 832 pages. Price $9.00. Philadelphia: J. B. Lippincott Co., 1934.

This is a book that is decidedly worth careful study by all interested in gynecology. Though comprehensive in scope, it is concise in form and the manner of exposition is most interesting. One comes from a study of this book feeling that he has had the privilege of having the whole field of gynecology carefully considered and assayed by a great clinician whose experience has been very extensive. The general effect of this work is so exhilarating that it is difficult to speak of the book in moderate language.

The illustrations leave nothing to be desired. The bibliographies are excellent.

Of outstanding interest are the chapters on physiology, backache, constitutional types, and endocrine disorders. However, all parts of the book are so well balanced and of such equal strength that it is difficult to single out conspicuous examples of excellence.

R. T. LaVake.

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society.

Volume 18 FEBRUARY, 1935 Number 2

HYPERPARATHYROIDISM*

JOSEPH F. BORG, M.D.

Saint Paul

AMONG the many advances of recent years in endocrinology none has been more worthy of recognition than the establishment of hyperparathyroidism as a definite clinical entity. The complete clinical cure of a condition heretofore markedly prolonged, extremely painful and hopelessly crippling, is indeed a triumph of the combined efforts of the clinician, the laboratory and the surgeon. As with many medical discoveries, this condition was early considered rare, but with increasing knowledge of its pathogenesis, and with increased diligence on the part of the profession, there has been a progressively increasing number of cases discovered, the surgical treatment of which has produced remarkable results.

Hyperparathyroidism is a disease caused by a hyperfunctioning adenoma of the parathyroid glands. This condition causes an increase in the amount of parathyroid hormone liberated into the blood stream, with a resulting characteristic alteration of calcium and phosphorus metabolism, and the typical clinical syndrome associated therewith. Normally the calcium level in the blood, under control of the parathyroid hormone, is held fairly constant at from 9 to 11 mgm. per 100 c.c. of serum associated with a blood phosphorus of 2.5 to 3.5 mgm. per 100 c.c. This is normally fairly constant on the average daily diet which contains from 0.5 to 1.0 gm. of calcium and results in the excretion of about 0.1 to 0.5 gm. calcium daily in the urine and 0.4 gm. daily in the feces. With an increased secretion of parathyroid hormone there is a lowered blood serum phosphorus, increased blood serum calcium, and a markedly increased excretion of both calcium and phosphorus, chiefly in the urine. This hypercalcemia is caused by the action of the increased parathormone on the bones, calcium being liberated, and eventually producing a clinical decalcification.

The disease is insidious in its onset, and produces a varied group of symptoms. The most common initial complaint is muscle weakness, due to a muscular hypotonia, usually most marked in the extremities and often associated with flatfoot, lassitude and constipation. Bone pain, a common symptom, is usually what brings the patient to the physician. This pain is usually marked in the bones of the legs, is associated with the decalcification and is often considered a neuritis or arthritis, resisting all treatment. As the disease progresses there is often a moderate weight loss, and moderate anemia, while the generalized decalcification progresses to a point of bone deformity. Bone cysts which may be easily palpated, and frequently pathological fractures, occur. A kyphosis may develop and the patient's stature may decrease. Unexplainable digestive complaints often arise, even simulating appendicitis, and there is frequently a polydypsia and polyuria associated with the efforts of the kidney to eliminate the excess calcium. Under these circumstances renal stone is a not infrequent complication and in at least seven reported cases was the source of the only complaint.

The appearance of any one or a combination of the foregoing symptoms should suggest the possibility of hyperparathyroidism, and x-ray of the bones, blood calcium studies and twenty-four hour urinary calcium excretions, should be made. While in but rare exceptions the blood calcium will be increased and the blood phosphorus decreased, a careful study of the twenty-four hour urine calcium will always show an increased excretion. The roentgenogram in early cases will show a diffuse ground glass appearance of the bones, a generalized decalcification throughout the skeleton. Later the formation of cysts and the redeposition of new bone produces the typical picture of osteitis fibrosa cystica, by which name this condition has previously been known. As far as known, hyperparathyroidism is always due to a benign adenoma of the parathyroid gland, which may vary in size from a bean to an egg, and is sometimes cystic. The tumor may be located behind any pole of the thyroid gland or it may be aberrant and hard to find. It may be located in any part of the neck, or in the mediastinum, and where the clinical diagnosis has been established, the responsibility is on the surgeon, who must persistently explore for the tumor. The removal of normal parathyroids has failed to produce recovery.

---

*Presented in Symposium on Endocrinology at the annual meeting of the Minnesota State Medical Association, Duluth, July 17, 1934.

In conclusion, then, the medical profession is presented for its consideration a well established clinical picture of oversecretion of the parathyroid hormone, a long standing, seriously disabling, disease. It is not difficult to diagnose, and the neglect of consideration of it is serious, especially so when satisfactory treatment is available. It must be remembered that all of the symptoms mentioned need not occur in any one case, but that the occurrence of any, or particularly a combination, should lead to an investigation of the calcium metabolism. The laboratory is indispensable in establishing the diagnosis in this condition, as numerous other conditions may simulate the clinical picture which it presents, but no other known disease presents its characteristic alterations in the blood calcium level and urinary calcium output. The determination of these is not difficult and should be provided by every well trained experienced laboratory technician. When seventeen cases could be reported from a single hospital in a period of two years, the condition cannot be regarded as uncommon. When seven of these cases were discovered by routine blood calcium studies on all the cases of renal stone admitted to this hospital, the importance of the consideration of hyperparathyroidism in this condition is emphasized.

Therefore, every patient exhibiting lassitude, muscular weakness, recent flat-foot, persistent extremity pains, bone deformity, pathological fracture, polyuria or signs of renal stone, otherwise unexplained, should have the advantage of a study of calcium metabolism. Such consideration is not too much to give when it will undoubtedly result in the recognition of hyperparathyroidism as the cause of some puzzling clinical problems.

THE PRESENT STATUS OF OUR KNOWLEDGE OF THE ADRENAL GLAND*

MAX H. HOFFMAN, M.D.

Saint Paul

ALTHOUGH recent contributions to our knowledge of the adrenal gland has added to our fund of information, the mechanism underlying its activity is still a mystery. We know that it is intimately concerned with certain metabolic functions, with growth and sex changes, but we lack a definite knowledge of the exact manner of this action. This deficiency in our knowledge is not the result of investigative inactivity. During 1933 about 600 reports were published dealing with some phase of adrenal gland disease or physiology.

The gland consists of two portions, embryologically derived from different anlage. The cortex develops from the wolffian bodies from which the genital structures originate, and the medulla comes from the same anlage as the sympathetic nervous system. This explains somewhat the relationship between the adrenal cortex and sex differentiation and between the medulla and certain nervous phenomena related to it.

As far as we know today the entire function of the medulla is concerned with the secretion and storage of epinephrin. It acts to aid the individual to run or fight, and the "emergency theory" of Cannon has been quite generally accepted. The medullary portion of the adrenal gland is not necessary for the maintenance of life. Certainly, except in emergency periods, very little if any epinephrin is excreted into the blood stream. There is a small amount of evidence to show that epinephrin is formed in the cortex and stored in the medulla, but this evidence is not at all convincing.

---

*Presented in Symposium on Endocrinology at the annual meeting of the Minnesota State Medical Association, Duluth, July 17, 1934.

Of much more importance is the adrenal cortex. This part of the gland is essential to life, and its destruction or removal leads to death in an experimental animal in about ten days. Following complete adrenalectomy, several things happen. The animal loses its appetite and becomes very weak. It loses weight rapidly. Circulatory failure sets in and later convulsions and death. Along with these general symptoms there is a marked decrease in blood sugar, and in the liver and muscle glycogen. On account of the loss of fluids the blood concentration increases. The calcium phosphorus and non-protein nitrogen of the blood increases. Before death the animal presents a picture of hypoglycemia or shock, indicating that death was due to a severe metabolic or circulatory disturbance.

Three theories of adrenal cortical function have been advanced and are based on studies after adrenalectomy and with the aid of the adreno-cortical hormone. Britten and Silvette[2, 3, 4, 5] have pointed out the similarity between the symptoms presented by adrenalectomized animals and those with hypoglycemic shock. They believe that death following adrenalectomy results from marked changes in the carbohydrate metabolism. When adreno-cortical hormone is administered to these animals, the normal carbohydrate levels are promptly restored. The proponents of the theory realize it does not explain all the disturbances that occur after adrenalectomy, but they believe the basic change is in the carbohydrate metabolism.

Hartman and his co-workers sponsor the idea that the adrenal gland produces a hormone that acts on all the cells of the body—that it is a general cellular hormone. Although this theory is rather vague, the number of the various tissues involved, following adrenalectomy, lend to it some support.

A third theory advanced by Swingle[5] is to the effect that the function of the adrenal cortex is to "regulate and maintain the normal circulatory volume in the vascular system. That in the adrenalectomized animals, fluid is being continually lost in the circulation, presumably by transudation through the capillary walls. The adrenalectomized animal is unable to maintain his normal blood volume, and eventually dies of circulatory collapse, due to an insufficiency of circulatory fluid." The decrease in blood volume produces a decrease in blood pressure and an increase in the blood viscosity, which results in the slowing of the circulation. Swingle compares the striking similarity of adrenal insufficiency with that of shock.

These three theories have been advanced by men whose contributions to our knowledge of the adrenal gland have been of the highest value. Each conception has the support of considerable experimental and clinical evidence, but no one alone seems to be satisfactory. The failure of the adreno-cortical hormone to clarify this subject has been most disappointing. The isolation of this extract by Swingle and Pfiffner and Hartman has been one of the real achievements of endocrinology. This hormone will promptly and completely relieve all the symptoms of experimental adrenal insufficiency, and keep adrenalectomized animals alive indefinitely. Unfortunately the scarcity of this hormone and the excessive cost in producing it has prevented its application in conditions where it might prove to be of value. Kendall has recently crystallized and partially chemically identified this hormone, which leads us to hope that in the near future this substance will be synthesized.

In clinical medicine the cortical-adrenal hormone has been used with remarkable success in Addison's disease. At times it has restored almost lifeless individuals in a very dramatic manner. However, it has also had its failures, due in some cases to an insufficient amount of hormone, and in others to the tuberculosis underlying the destruction of the glands. It has been tried in a very limited way in other conditions but with no success. So far we are able to recognize only one clinical condition associated with hypofunction of the adrenal, and that is Addison's disease. The other states referred to as hypoadrenia have not been definitely established.

Hyperfunctioning states of the adrenal gland have recently received considerable attention. They are associated mostly with tumor development in the medulla or cortex. This type of overactivity is rather characteristic of all of the glands of internal secretion. Such tumor growths are found in hyperparathyroidism, hyperinsulinism, and hyperactive conditions of the pituitary and thyroid glands.

In the adrenals these tumors are capable of bringing about two types of changes, one concerned with pseudohermaphroditism in early life and a reversal of the secondary sex characteristics in the adult, and the other evidences itself most prominently in hypertensive conditions. The exact relationship between the adrenal and the sex glands is not clear. Several observers working with the cortical-adrenal hormone claim that it has a definite effect on the sex characters; others fail to confirm this finding. This discrepancy is possibly due to the presence of a sex hormone, separate and independent from cortin, and the failure of these investigators to achieve the same results might be due to one using a preparation that contains both hormones, and the other one that contains only cortin. No adrenal sex hormone has been definitely isolated. Clinically the effect of adrenal activity on sex is most often seen in the female as a reversal of the normal sex characteristics. Hirsutism, overdevelopment of the clitoris, amenorrhea, and voice changes are the most prominent. Along with these, hypertension and obesity may be present. In the male adult with an adrenal tumor, virilism or effeminization may appear.

It is a question as to whether all pseudohermaphroditism is a result of adrenal overactivity. It is conceivable that same cases may arise in which the failure of complete sex differentiation is due to chromosomal influences. Bauer[6] believes that the adrenal hormone is capable of stimulating to development the latent sex characters of the opposite sex which are normally present, and at the same time it inhibits the effect of the hormone of the sex gland. The sex reversal process can also take place with a hyperplasia of the cortex of the gland in the absence of a tumor. This condition does occur in the syndrome described by Cushing as basophilism, where presumably the basophilic cells of the anterior pituitary lobe secrete an adrenotropic hormone. The clinical picture of obesity, hypertension, plethora and sexual disturbances is common to both conditions.

The other type of adrenal tumor is associated with hypertension. A number of such cases are now on record that are definitely associated with adrenal growths. The tumor may be cortical or medullary or involve both portions. It may also develop in paraganglionic tissues. With the latter has been associated the paroxysmal type of hypertension described by Mayo and others.

Successful removal of these tumors has been accomplished in several instances, and one such tumor was found to contain a large amount of adrenalin. On the basis of the above observations regarding the relationship between adrenal overactivity and hypertension, operation on the glands has been attempted. Partial resection of the glands, denervation, and sympathetic ganglionectomy have been tried wtih some good results. Crile has practiced denervation of the glands in other conditions, such as hyperthyroidism and neurocirculatory asthenia. He describes the adrenals as being "the brain or the powerhouse of the sympathetic nervous system." The entire subject is much too recent to have developed beyond the experimental stage. Its progress will be watched with great interest, as it offers therapeutic possibilities in conditions where we now can do very little. Rowntree[7] calls our attention to the necessity for more clinical investigation in the field of adrenal diseases, as he feels it has been very much neglected.

Marine[6] and others have brought out some evidence that the adrenal may be concerned with resistance against toxins and infections. Animals deprived of their suprarenal glands are definitely less resistant to morphine and histamine, this sensitiveness being reduced by injecting adrenal cortical hormone. These animals have been shown also to be less resistant to bacterial infections.

Modern endocrinology is still in its infancy, and as our knowledge increases we realize more and more that the endocrine glands form a system in which each gland acts to inhibit or stimulate the other. The adrenal gland is not the least important in this group. This short review of the present status of our knowledge of this gland has pointed out its incompleteness; at the same time we cannot fail to be impressed with the rapid advances that are being made which may offer much to the clinician of the future.

Bibliography

1. Bauer, Julius: Zur heutigen Standes Nebennierenproblems. Deutsch med. Wchnschr., 15:565, (April) 1933.

2. Britten, S. W.: Evidence of the chief function of the adrenal cortex. Endocrinology, 16:633, 1932.
3. Britten, S. W., and Silvette, H.: Theories of cortico-adrenal functions. Science, 77:355, (April) 1933.
4. Britten, S. W.: Adrenal insufficiency and related conditions. Physiol. Rev., 10:617, (Oct.) 1930.
5. Britten, S. W., and Silvette, H.: On the function of the adrenal cortex—general, carbohydrate and circulatory theories. Amer. Jour. Physiol., 107:190, 1934.
6. Marine, David: Some effect of suprarenal injury on natural and acquired resistance. Libman Anniversary Volumes, 2:773, 1932. The International Press, New York.
7. Rowntree, L. G., and Ball, Ralph G.: Diseases of the suprarenal glands. Endocrinology, 17:263, 1933.
8. Swingle. W. W., Pfiffner, H. M., Vars, H. M., Batt, P. A., and Parkins, W. M.: The function of the adrenal cortical hormone and the cause of death from adrenal insufficiency. Science, 77:29, (Jan.) 1933.

THE CLINICAL APPLICATION OF THE OVARIAN FOLLICULAR HORMONE*

L. F. HAWKINSON, M.D

Brainerd, Minnesota

THE follicular or estrus-inducing hormone of the ovary is commonly called estrin. It is obtained commercially from the urine of pregnant women, the amniotic fluid of cattle and from the human placenta. This hormone is also known as folliculin, amniotin, progynon, theelin, sistomensin and various other trade names. It is available in both oral and hypodermic forms, both of which are potent. The ratio of the oral to the hypodermic dosage is about four to one.

The hormone has been used in practically all the ills of the human female. In some conditions it has proven of value; in others the misuse of the hormone, especially in large doses, has probably caused some harm.

There are several conditions in which estrin is now felt to be specific. These conditions are: amenorrhea with hypoplasia, functional dysmenorrhea, gonorrheal vaginitis in children, and menopausal disturbances.

Amenorrhea with Hypoplasia

Though the amenorrhea may be due primarily to a deficiency of the pituitary hormone, estrin is first used to vascularize and increase the size of the uterus, thereby making it more responsive to pituitary therapy.

The Frank and Goldberger test to determine the amount of hormone in the blood is of value but often difficult to obtain. The determination of the degree of uterine hypoplasia is of greater value and almost indispensable in these cases. This is accomplished by passing a graduated uterine sound, discounting the long cervix usually found. A measurement of less than seven centimeters calls for intensive treatment with the ovarian follicular hormone. The amount of hormone to be administered is directly proportional to the degree of hypoplasia and the administration should be continued until the uterus is of normal size. In cases where the hypoplasia is marked, one thousand rat units daily is usually required for several months. When the hypoplasia is not marked, one hundred to two hundred rat units daily by mouth for several months is usually sufficient. The cost of the treatment in amenorrhea with hypoplasia is necessarily high.

Functional Dysmenorrhea

It is estimated that 15 to 20 per cent of virgins suffer from functional dysmenorrhea. Only one-third of these can be relieved by operative procedures but the percentage relieved by hormone therapy is estimated at 60 to 80 per cent.

The hormone is best given beginning the sixteenth day of the menstrual cycle. A great majority of patients are relieved by the oral administration of one hundred rat units twice daily for ten days. It is advisable and often necessary to continue treatment for three months. If results are not obtained with the smaller doses, larger doses should be given. The failure to obtain relief in this type of dysmenorrhea is usually due to insufficient dosage.

---

*From the Brainerd Clinic, Brainerd, Minn. Presented in Symposium on Endocrinology at the annual meeting of the Minnesota State Medical Association, Duluth, July 17, 1934.

Gonorrheal Vaginitis in Children

Gonorrheal vaginitis in children responds to estrin therapy when all other types of therapy have failed. The object is to change the character of the vaginal mucosa without producing uterine bleeding. Fifty to one hundred rat units daily until the vaginal smears are free from gonococcus is the suggested dosage. This type of therapy is not applicable to gonorrheal vaginitis in the mature woman.

Menopause

The major symptoms of natural menopause are due to a gradual decline in ovarian function and substitution therapy with the ovarian follicular hormone is rational and productive of good results in the majority of cases. The hormone is most effective if given orally and it is rarely necessary to exceed forty rat units daily. Early failure or lack of results from small doses should not lead to abandonment of treatment but should call for persistent use of this dosage. Only those cases of natural menopause in which the hormone is excreted in the urine fail to respond to this type of treatment. It is estimated that this group comprises less than 10 per cent of cases. The cost of treatment to the patient is about ten cents per day.

Surgical menopause requires the same type of treatment but the dosage should be somewhat higher. One hundred rat units daily usually controls the symptoms and this may be decreased as the symptoms subside. The hormone should be given as early following castration as possible.

There are several other conditions in which estrin has been used with considerable degrees of success. The hormone may not be specific in these conditions but it is certainly worthy of further trial.

Hyperemesis gravidarum often responds favorably to estrin therapy. Twenty-five to fifty rat units, intramuscularly, once to twice daily often controls this type of vomiting.

Painful breasts associated with menstrual disturbances are often due to inadequate amounts of the follicular hormone and many cases are relieved by the oral administration of two hundred rat units daily for five days preceding the menstrual period.

Migraine, frigidity, post-menopausal pruritus vulvæ, menopausal arthritis, menopausal epilepsy, involutional psychosis and senile vaginitis have been treated with the follicular hormone with varying degrees of success. It is probable that the hormone will be found to be of distinct aid in some of these conditions but it is not to be considered a panacea for all of them. More careful selection of cases, more accurate diagnosis, and more efficient test for the hormone in the blood and urine will be of distinct aid in determining the use of the hormone in these conditions.

The ovarian follicular hormone has been used experimentally in seven cases of hypochromic anemia. The fact that this condition is peculiar to women and is often associated with menstrual disturbances would lead one to believe that the condition may be endocrine in etiology. The results obtained in this small series of cases have been encouraging.

Clinical observations over the past four years would seem to indicate that at least one type of chronic nervous exhaustion is due to a deficiency of the ovarian follicular hormone, estrin. A preliminary report of these observations may be of interest.

Chronic nervous exhaustion is a term not well defined and is synonymous in the minds of many with neurasthenia. Chronic nervous exhaustion may be divided into several types and the type under discussion seems to be common in women and peculiar to that sex.

A short description of the syndrome will aid in its identification.

These patients complain of being tired all of the time. They awaken in the morning as tired as they went to bed. Exhaustion after exertion is often extreme. Nervousness, irritability and emotional instability are usually present. They worry over trivial matters, cry easily and are critical of their environment. Palpitation, gastric disturbances, choking spells, aches and pains in various parts of the body are often additional symptoms. The history frequently suggests a mild hyperthyroidism but the metabolic rate is usually normal or somewhat depressed. Amenorrhea, scanty menstruation and dysmenorrhea are frequent, though the syndrome is not uncommon in the absence of menstrual disturbances. Frigidity is common. There is seldom organic disease to account for the symptoms.

The condition is more frequent after repeated pregnancies, miscarriages or following the removal of an ovary or an ovarian cyst, damage to the blood supply of the ovaries, or follicle cystosis. It is well established that a hypofunction of the ovaries may exist at any time from puberty to menopause.

The symptoms of menopause or castration, due to decline or a deficiency of the follicular hormone, are similar in many respects to the symptoms of this type of chronic nervous exhaustion. The follicular hormone of the ovary allays the hyperexcitability of the autonomic nervous system incident to menopause. It is logical to assume that this hormone will have the same effect at any time from puberty to menopause.

The series consists of over one hundred cases. Controls have been used consisting of substituting other preparations for the hormone and discontinuing treatment for a period of time. Return of symptoms was the rule following these procedures.

The dosage used in the treatment of these cases usually has been low. Fifty rat units by mouth has been sufficient in the majority of cases. It is rarely necessary to exceed one hundred rat units daily. The results have been excellent in about 75 per cent of cases. The majority have been able to discontinue the hormone after two to three months, though in ten cases it has been necessary to continue the hormone indefinitely. Pituitary therapy has been used in conjunction with the estrin in fourteen cases.

The oral administration of the ovarian follicular hormone is preferable in all cases not requiring large doses. The hypodermic method necessitates frequent visits to the physician and it has been proven that large doses of the aqueous preparations, given by the hypodermic method, are not adequately absorbed. The newer preparations of the hormone in oil, in which the period of absorption is six to ten days, seem to offer a marked advantage where large doses of the hormone are required.

Recent results obtained with the hormone in oil (Progynon B, 2,000 and 10,000 R.U.) would indicate that the doses generally used and herein recommended are inadequate in many cases. It is probable that in the future we will speak in the terms of thousands of rat units, rather than in hundreds.

SUPRARENAL CORTICAL HORMONE*

EDWARD C. KENDALL

Rochester, Minnesota

THE isolation in pure crystalline form of the hormone of the suprarenal cortex was reported about three months ago.[3] Its chemical and physical properties have been determined and an investigation concerning the chemical structure of the molecule is far advanced.

The isolation of a single substance in pure crystalline form closes one chapter of the investigation. The most important question at the present time is whether or not the crystals which have been separated are in fact the hormone of the suprarenal cortex. Before attempting to answer this question I shall review briefly some of the quantitative results which we have obtained in regard to the distribution of this compound. In confirmation of the results of other workers, we have found that only a small amount of the hormone of the suprarenal cortex, cortin, is present in the gland.[1] We have recently found that the amount is equal to approximately 1 per cent of the epinephrine in the same weight of gland. The amount of epinephrine present averages somewhat less than 0.2 per cent of the wet weight of the gland. Thus, less than 0.002 per cent of the wet weight of the gland is cortin. The amount of cortin in both glands of a beef is about 0.5 mg. and the weight of cortin in a single gland is therefore approximately 0.25 mg. These values emphasize the fact that the commercial preparation of cortin is surrounded by problems which do not have to be met in the treatment of some of the other ductless glands. In the case of the thyroid gland, the simple desiccation and removal of the fat is the only treatment necessary for the satisfactory preparation of an active form of thyroxine. With the parathyroid, the gland may be given a drastic treatment with hot mineral acid without destruction of the active agent. Special problems are encountered in the preparation of insulin because of the presence of enzymes which can bring about its destruction, but all of these problems have been satisfactorily solved and insulin can be prepared and placed on the market at a reasonable price. In the near future, cortin will be available at a price which will be within the reach of most patients, but certain limitations apparently will restrict the production of cortin and always will make this compound a relatively expensive one.

---

*From the Section in Chemistry, The Mayo Foundation, Rochester, Minnesota. Presented in Symposium on Endocrinology at the annual meeting of the Minnesota State Medical Association, Duluth, July 17, 1934.

Under these conditions it seems desirable to carry out an exhaustive chemical study of the suprarenal cortex, not only so that cortin may be prepared as cheaply as possible from the gland but so that we may gain an insight into the chemical structure of the molecule. A knowledge of the structure of cortin is desirable for two reasons: (1) so that we may relate its activity to physiologic processes and to other active agents in the body, and (2) there is always the hope that cortin may be prepared synthetically at a price which will make it available to all.

The investigation of the chemical structure of any compound must be preceded by the isolation in pure crystalline form of the compound in question. It therefore becomes a matter of great interest to determine whether or not the crystalline compound isolated can bring about a physiologic effect which is identical with that produced by extracts prepared from the suprarenal gland.

Hartman and Swingle and Pfiffner were the first to show that an extract can be prepared from the suprarenal cortex which will maintain animals in normal condition after complete removal of the suprarenal glands. Several methods have been proposed for the preparation of cortin from the suprarenal gland. We have prepared large amounts of cortin by a method which need not be given at this time. After complete suprarenalectomy we have found that dogs can be maintained in normal condition in respect to body weight and all other criteria which can be applied. The daily requirement for each animal can be determined by administration of the solution. In each case a certain minimal amount must be given in order to maintain the animal.

If to such an animal cortin in crystalline form is administered in place of the extract from the gland there is no loss in weight or other change; the animal remains in normal condition. If then the administration of crystalline cortin is stopped, the animal very promptly develops symptoms of suprarenal insufficiency. One dog that was treated in this way died on the third day after administration of crystalline cortin had been stopped.

A patient who had a severe case of Addison's disease was maintained for eighteen days by administration of about 10 mg. of crystalline cortin each day, without development of signs of insufficiency. Finally, a dog which was suprarenalectomized by Doctor Mann was given the crystalline hormone during the eight days following operation. The dog received no other form of medication and survived the operation. It appeared to be normal at the end of eight days and was placed on a high salt diet. The dog is still living.

With these results we feel satisfied that the essential physiologic activity which can be demonstrated in the solutions made from the suprarenal cortex is also produced by the substance which has been separated in pure crystalline form.

We have furthermore found that the cortin in crystalline form is quite insoluble in water; 1 part will dissolve in about 10,000 parts of water. There is present in the solution, however, a more soluble form of the hormone which will exert the same physiologic effect, and, insofar as can be determined, the weight of material in soluble form is the same as the weight required in crystalline form. The exact relation between the two forms has not yet been established but the essential groupings appear to be aldehyde and hydroxyl groups. There is no change in molecular weight when the hormone assumes the less soluble form. The problem of the chemical nature of the suprarenal cortex has now been reduced to a concrete problem in organic chemistry. We may feel certain that in the near future the structure of the crystalline hormone will be established, and after this has been accomplished we shall be in a position to know whether or not this complex substance can be made synthetically.

Bibliography

1. Britton, S. W., and Silvette, Herbert: The cortico-adrenal hormone. Science, 73:322-323, (Mar. 20) 1931.
2. Hartman, F. A., and Brownell, Katherine A.: The hormone of the adrenal cortex. Science, 72:76, (July) 1930.
3. Kendall, E. C., Mason, H. L., McKenzie, B. F., Myers, C. S., and Koelsche, G. A.: Isolation in crystalline form of the hormone essential to life from the suprarenal cortex; its chemical nature and physiologic properties. Proc. Staff Meet., Mayo Clinic, 9:245-250, (Apr. 25) 1934.
4. Swingle, W. W., and Pfiffner, J. J.: An aqueous extract of the suprarenal cortex which maintains the life of bilaterally adrenalectomized cats. Science, 71:321-322, (March) 1930.

A BASOPHILIC ADENOMA OF THE PITUITARY GLAND*

HENRY L. ULRICH, M.D.

Minneapolis

G. D., a married woman, twenty-seven years of age, first entered the hospital January 6, 1933. There were three admissions. The first January 6 to March 3, 1933, the second from June 2 to June 21, 1933, and the third November 11 to November 13, 1933, the date of her death. During July, August, September and October, she was observed in the out-patient department. Practically, this patient was under supervision some ten months.

Her complaint on entrance was: weakness, headaches, painful abdomen (particularly on the left side), polyuria, polydipsia, polyphagia. She was also suffering from boils about the thighs and gluteal region.

The family history is not very illuminating. Her father is a large man, six feet two inches tall and weighing 212 pounds. He has hypertension. Her mother died of an accident at thirty-five. No details of her appearance were given. One brother is tall, thin and very nervous. One sister, aged thirty, is short and fat, and has had two normal children. One sister is twenty-four and is tall and stout. Both sisters have normal menstruation.

The personal history reads as follows: Up to seven years of age she was puny, underweight and suffered from asthma. The asthma disappeared at seven and a period of good health supervened until sixteen, at which time she weighed 160 pounds. Her menses began at sixteen, but were scant and painful. At nineteen she married. She has never been pregnant. At twenty-five her weight had reached 220 to 230 pounds. At twenty-four she noticed her first crop of boils. At twenty-six hypertrichosis and amenorrhea appeared, likewise the symptoms of diabetes, that is, polydipsia, polyphagia and polyuria; also weakness, frontal headaches, abdominal pains. A few months before entrance she had lost fifty pounds. There had been an emotional upset and the patient starved herself.

Her physical examination (a composite picture is detailed of numerous examinations in which there was little variation) showed a woman of small stature with a remarkable appearance. Her face, which was full, had a plethoric hue with a growth of hair on the sides, resembling the Burnside type of whiskers. There was fairly long hair on her upper lip and under the chin. Her extremities were small in comparison with her body. There were deposits of fat over the shoulders; the breasts were large and pendulous. The abdomen was very obese. There were striæ over the abdomen of a purplish hue. The lungs were clear. The heart was rapid, regular, somewhat enlarged to the left. Blood pressure was 178 systolic and 122 diastolic. The abdomen was so fat that palpation was worthless. There were old scars and pigmented areas of previous skin infections over the buttocks and thighs. The pelvic examination by the gynecological staff detailed external genitalia normal; the vagina nulliparous; uterus one-half the normal size; adnexa negative. Impression: Pubescent genitalia.

X-ray of the gastro-intestinal and genito-urinary tracts revealed nothing except a large left kidney. A retrograde pyelogram on this side showed a normal pelvis. X-ray of the skull showed some osteoporosis of the calvarium; sella slightly, if any, enlarged; posterior clinoid process showed some erosion. X-ray of the spine and pelvic bones showed normal structure, possibly some osteoporosis. X-ray of the heart elicited a slight enlargement to the left.

Laboratory studies: Urine showed large amounts of sugar; no other abnormalities were observed. At no time during the ten months was she sugar-free. Her blood pictures were normal, with a tendency toward high values. The hemoglobin ranged from 88 to 100 per cent, reds 4,650,000 to 5,410,000, white 7,800 to 8,850, with normal differentials. Platelets 205,580. Her last blood picture, during the acute terminal illness, read: hemoglobin 74 per cent, whites 9,800, reds 3,800,000, polymorphonuclears 80 per cent, lymphocytes 20 per cent. Blood chemistries were normal, except blood sugars, which were always high, ranging above 200 mgms. Sugar tolerance tests in January and June showed the characteristic diabetic curve. The blood calcium (three readings) was within normal limits. Bleeding and clotting times were normal. The basal

---

*Read before the Minnesota Pathological Society, January 16, 1934, and also presented in Symposium on Endocrinology at the annual meeting of the Minnesota State Medical Association, Duluth, July 17, 1934.

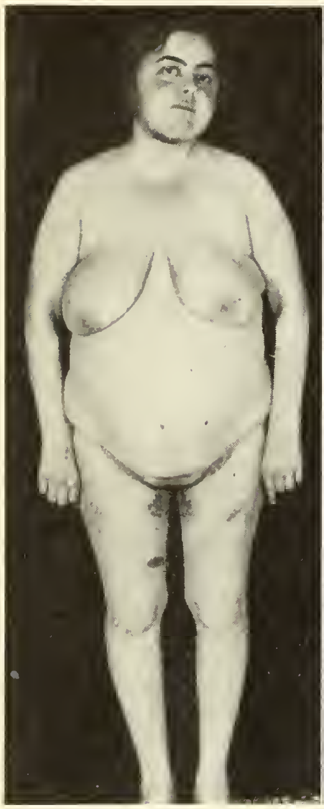


Fig. 1 *(left)*. Front view of patient showing the full face and the hirsuties of face. The plethora cannot be reproduced in the print. Also the disproportion of torso to extremities. The pigmented areas on thighs of previous skin infections can be seen.

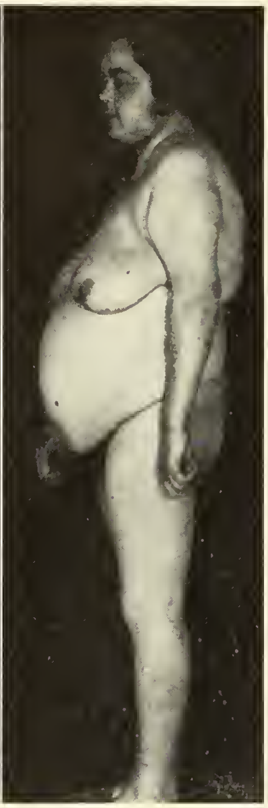


Fig. 2 *(right)*. Lateral view showing the fat deposits on the body. The striæ are poorly visualized.

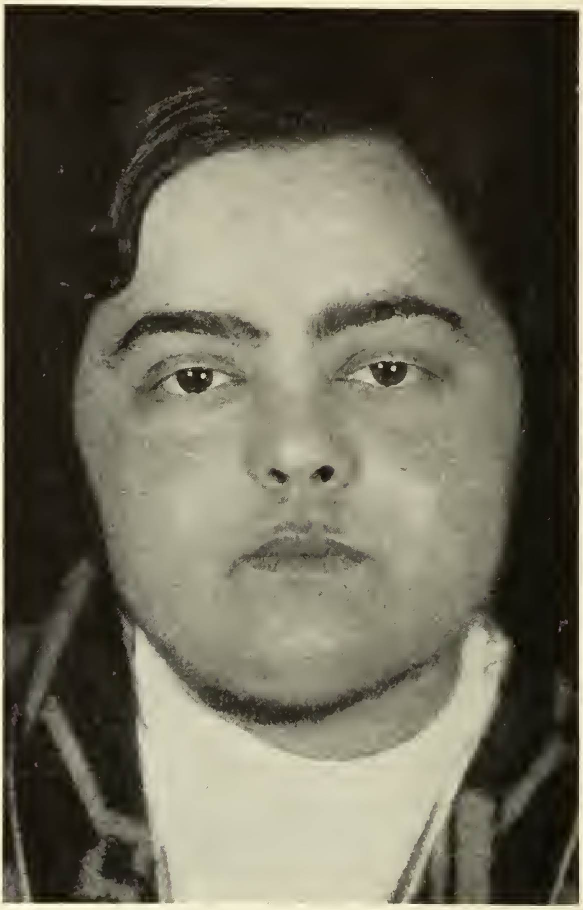


Fig. 3. Face of patient showing the beardlike growth.

metabolic rates were minus 4 per cent, minus 7 per cent and minus 11 per cent. The visual fields, by perimetric, nerve and retinal studies, were normal.

Her striking appearance immediately aroused a discussion as to the cause of her symptoms. Dr. Luther Fisher, Fellow in Medicine, was the first to suggest we were dealing with a basophilic adenoma of the pituitary. This opinion was concurred in by the Staff. The last week in February and early in March she received x-ray therapy of the sella and was discharged. During the interim she had· had vigorous treatment for her diabetes, with improvement of her polydipsia, polyphagia and polyuria, but at no time was her urine sugar-free.

She returned in June for observation. Her symptoms of diabetes had been ameliorated. Her appearance and weight had not changed. The x-ray of the skull showed essentially the same findings as on previous examination. Her urine, blood picture and blood sugar levels were unchanged. Boils continued to appear. She was discharged to the Out-Patient Department. Here, she did not do so well.

During July, August, September and October her diabetic symptoms increased. The records in the Dispensary show her blood pressure 220/138. She had daily attacks of dizziness with fainting spells.

On November 11 she reappeared at the hospital. Following a pin prick in her left hand she developed a fulminating infection in her hand. The cellulitis extended up the forearm, with axillary breakdown. The axillary abscess was incised and she died November 13, 1933, of terminal bronchopneumonia.

The post-mortem report is as follows: (We are indebted to Dr. Richard Johnson for the permission and Dr. William O'Brien for reports of the section.)

1. Infection: Left arm and axilla. Death due to lobular pneumonia.
2. Hypertension: Heart weighed 475 grams. There is no sclerosis of the aorta and other vessels. Kidneys show mild evidence of hypertension.
3. Pineal: Shows normal limits of calcification.
4. Thyroid: Weight 24 grams. Histologically normal.
5. Parathyroids: Normal. Not hyperplastic.
6. Thymic body: 60 grams. Atrophic, fat.
7. Pancreas: Normal.
8. Adrenals: Right 10 grams, left 9.4 grams. Histologically normal. Slight atrophy of the medulla with infiltration of lymphocytes.

9. Ovaries: 7 grams. Senile.
10. Uterus: Small.
11. Breasts: Fat. Atrophic glands.
12. Pituitary: The pituitary is large, eroding the posterior clinoid. There is evidence of it bursting through the diaphragm. A tumor is found in the anterior lobe, crowding the pars intermediares and posterior lobe backwards and laterally. On section there is much calcium distributed throughout the tumor mass.

All other organs are normal.

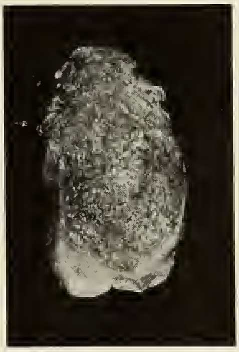


Fig. 4. Pituitary cut sagittally 1-1 showing the size of the new growth, its displacement of what is left of the anterior and posterior lobes. The stalk is also seen.

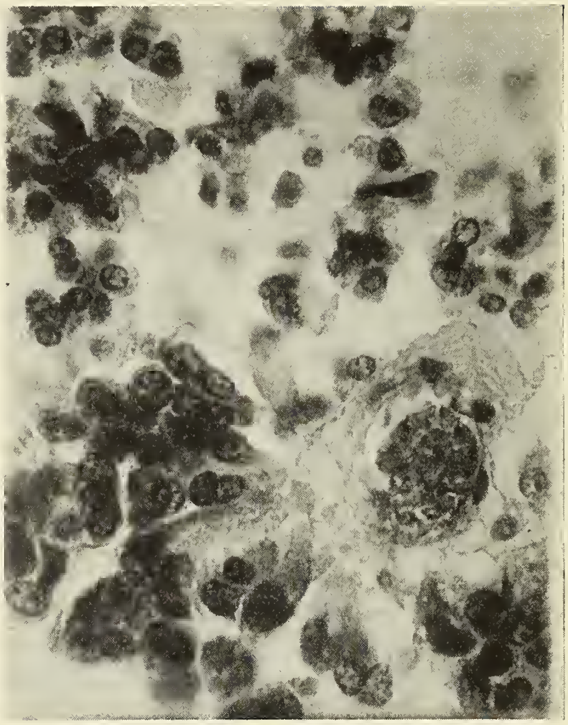


Fig. 5. Microscopic section 1-600 of tumor cells.

The essential finding in our case is obesity of a special type, with plethora, hypertrichosis, hypertension, amenorrhea, glycosuria and hyperglycemia, osteoporosis, skin lesions, with susceptibility to infection. This clinical picture is usually found in early adult life, and, with its variants, Cushing[2] hypothecates, is due to an adenoma of the pituitary and that this adenoma is basophilic in type. This adenoma, like the acidophilic adenoma, which gives us the picture of acromegaly, delivers a hypersecretion, which in turn disturbs the endocrine system to the extent of transforming a normal individual into a clinical picture such as we have described.

This same picture, with unessential variations, has been attributed to tumors, sometimes malignant, of the adrenal glands.

In the male, the same findings and symptoms occur, with these variations: instead of hypertrichosis, hypotrichosis obtains, and, in the genital sphere, loss of libido with atrophy of the testicles.

In the female, before puberty, the same findings occur except that there is evidence of precocious sexual maturity, as manifested by menstruation and the size of the genital organs.

Hypertrichosis, with masculinization of the female, without hypertension has been described in the arrhenoblastomas of the ovaries, which have recently been discussed by Novak.[5]

Cushing[2] reports 385 verified cases of pituitary adenoma; of these 277 were chromophobes, 107 were acidophilic and "mixed," and one basophilic. He has, however, searched the literature and has discussed seventeen cases of what he thinks were basophilic tumors of the hypophysis.[3] In ten of these seventeen cases, definite post-mortem and histological evidence of basophilic adenoma was found. In four, there is presumptive evidence. Tumors were found. The tinctorial properties of the cells of these tumors were not established. In two, the pituitary was said to be normal, grossly, and no histological examination was made. In one, his prediction was proven absolutely wrong. This was a case of carcinoma of the thymus, with a normal pituitary, grossly and histologically. The adrenal glands were reported enlarged and hyperplastic.

It would lead us too far afield to attempt a discussion of a correlation of the clinical picture and the dysfunction of the endocrine system in this type of case. Using the acidophilic adenomas as an example, there is no question but that they modify, anatomically and functionally, the other glands, particularly the thyroid, the adrenal, the pancreas and the gonads. If basophilic adenomas are of a hypersecretory type, the assumption that they modify the other glands of internal secretion is justifiable. Anatomically, outside of the gonads, there is not much evidence of this effect.

Obesity is notoriously a symptom in dysfunctions of the hypophysis, whether they are hyperactive or hypoactive types. The physiology of the pituitary is as nebulous today as was the thyroid yesterday. The interrelation of the adenohypophysis and the neurohypophysis and its stalk, is a hodge podge of experimental, histological, neurosurgical and clinical observations as well as assumptions. In adiposa dystrophia genitalis there is a tendency to attribute adiposity to changes in neurological areas near the base of the stalk and not to the pituitary itself.

Tolerance for sugar is a definitely established fact in hypopituitary states. Intolerance for sugar is notorious in acromegaly and what is now purported to be hyperactive states of the basophilic cells. Whether this tolerance is due to an inhibitory action on the islets of Langerhans, or peripherally as an antagonistic insulin effect, is unknown.

The hypertension is difficult to explain. Cushing attributes it to excess of neurohypophyseal secretion. Compatible with this is the fact that in chromophobe cases, which compress the posterior lobe out of all recognition, invariably there is a subnormal blood pressure. Whether the hypersecretion of the basophilic cells stimulates posterior lobe activity is not clear.* Heretofore the vascular hypertension of polyglandular disorders has been ascribed to adrenal sources. The hyperplasia of the adenals associated with basophilic adenomas occurs in the cortex. It is in the medulla that epinephrine is elaborated.

The osteoporosis is hypothecated as being due to a stimulation of the parathyroids. Hyperplasia of the parathyroids has been described in some of the cases. One adenoma is mentioned.

The adrenals are described as hyperplastic in most instances. This is true also in acidophilic tumors. Adenomas of the adrenals were found in two cases. In one case an adrenal rest was found in an ovary.

The fact that is most contradictory in this group of cases is the effect on the ovaries. Invariably there is cessation of ovulation and atrophy of the ovaries, to say nothing of th atrophy of the genital organs. If the basophi cells elaborate gonadotropic hormones, which stimulate folliculization and luteinization, why do we not find this present in these cases of basophilic adenoma? There is no answer to this question. Nor is there an answer to the question: Why does this tumor initiate precocious sex activities in the immature and stop sex function in the mature?

Cushing does not discuss the cause of the hypertrichosis. It is possibly a hypogonadal effect.

I might quote his end remark on a discussion of these topics:[3]

> "While fully believing the adenohypophysis is the root of all this evil relating to the disturbances of growth and sexual activity, it seems almost too much specifically to charge it with thyroid activating; glycogenic, lactogenic and menstrual-initiating properties and other crimes of like sort, for which its subordinate accomplices may well enough be responsible."

Whatever we may think of this syndrome, at any time we may be embarrassed by a similar problem, as was Cushing[3] recently. This patient showed precocious adolescence at ten, associated with normal menstruation, which continued for three years, then abruptly ceased. She acquired a plethora with hirsuties; she became increasingly abdominous with striæ. She had persistent backache with decalcification of vertebræ; and an abnormal calcium output. A spontaneous fracture of the pelvis occurred, which healed with callus. She had a lowered metabolic rate, lowered tolerance for carbohydrates and a high blood pressure. Her urine contained a substance which gave the Aschheim-Zondek tests for pregnancy. Following x-ray of her sella, her backache disappeared, her blood pressure became normal, her abdominal striæ lost their bright color, her menses returned seven months after the x-ray therapy, her urine lost the Aschheim-Zondek body. The hirsuties is disappearing.

Dr. Richard Johnson and I have considered a patient who has some of the clinical specifications of the one just related. A few years ago we would have considered an exploratory operation on the adrenals. Today, we are debating whether we should use x-ray therapy on the sella. Three cases of this type have been treated by radiation: case 11 of Chicago,[2] Cushing's fifteen year old girl mentioned above and the present case. The Chicago and Boston cases showed improvement. Ours did not.

---

*Cushing recently (Am. Jour. Path., 10:145, March, 1934) has called attention to the invasion of basophilic cells into the pars nervosum in conditions such as eclampsia and hypertension.

In conclusion: A case is reported which has most of the hall-marks of the cases described by Cushing, as a syndrome due to basophilic adenoma of the pituitary. At post-mortem a tumor of the anterior lobe was found. Professor Rasmussen of the University of Minnesota identified the cells of this tumor as basophilic in type.

Addendum: Since this was presented, several reports have come out verifying Cushing's observations. A report by Russell and Evans[6] is of particular interest since they describe variants from the original clinical picture. Jamin's[4] report is of interest in that the patient responded to x-ray therapy.

Bibliography

1. Bailey, P., and Cushing, Harvey: Studies in acromegaly VII, etc. Am. Jour. Path., 4:546, 1928.
2. Cushing, Harvey: Johns Hopkins Bulletin, 50:137, (March) 1932.
3. Cushing, Harvey: Pituitary body, hypothalamus. Springfield, Ill., C. C. Thomas, 1932.
4. Jamin, Friedrich: Die hypophysare Plethora. Münch. Med. Wchnschr., 81:1045-1085, (July 13, 20) 1934.
5. Novak, Emil, and Long, J. Herman: Ovarian tumors associated with secondary sex changes. Jour. Am. Med. Assn., 101:1057, (September) 1933.
6. Russell, Dorothy S., and Evans, H.: Two cases of basophilic adenoma of the pituitary gland. Lancet, 227:240 (August) 1934.

Summary of Symposium on Recent Acquisitions in Endocrinology

Dr. R. M. Wilder (Rochester, Minn.): If we stop to reflect on the difference between the symposium we have just heard and the kind of thing we used to hear in endocrinology only a few years ago, we will appreciate fully what an advance has been made in this field. This was then a fertile field only for charlatanism, since the endocrine preparations then available were for the most part without biological effectiveness. But today we are dealing with chemically pure substances, crystalline hormones, as Dr. Kendall has shown us in the case of the cortical hormone, or with preparations that are standardized in a very precise manner, so that we know we are dealing with substances of real activity. Methods of diagnosis have been developed based on the use of these active substances as well as new methods of treatment.

Endocrine conditions of which we were formerly unaware have been brought to our attention during the decade. Dr. Borg presented a classical instance of one of these, a syndrome that results from overfunction of the parathyroid glands. Nearly all of the cases of it have shown tumors, adenomas of the parathyroids, but recently from Boston, Albright, Bauer, and Churchill have described simple hyperplasia with hypertrophy of the parathyroids giving rise to a symptom-complex exactly like that which we have seen in cases with tumors. They point out that a subtotal ablation of the parathyroid tissue in these cases will lead to as much clinical improvement as is seen following resection of parathyroid tumors. They point out the analogy between this condition and hyperplasia and hypertrophy of the thyroid gland in hyperthyroidism. They demonstrate very interesting microscopic preparations to show a difference in the appearance of the cells of hyperplastic parathyroids and those of adenomas of the thyroid. The adenoma cell looks very much like the chief cell of the normal parathyroid gland. In the hyperplastic and hypertrophied glands, the cells are larger and clearer. Thus the surgeon who is operating in a case of hyperparathyroidism, when he encounters a parathyroid gland, removes that gland and can tell from examination of it whether to expect hyperplasia of the other glands. If he finds a tumor at his exploration and the histology of this tumor indicates a tissue that looks like the chief cell of the normal gland, he knows his operation is over. If he encounters a hyperplastic gland, he must look further, expose the other parathyroids and remove enough tissue so that clinical benefit can be expected.

Dr. Ulrich and Dr. Hoffman both referred to the clinical syndrome that Dr. Cushing has been calling pituitary basophilism. The syndrome, as has been pointed out, is a syndrome that we have in the past considered as due to overfunction of the adrenal glands. The same syndrome exactly, so far as we have been able to determine, is produced by cortical tumors of the adrenals. The same syndrome has been seen in cases with hyperplasia and hypertrophy of the adrenal glands in the absence of evidence of abnormality of the pituitary.

Recently, Dr. Walters described the results of the operation subtotal adrenalectomy in a case with hyperplasia, the operation being followed by marked clinical improvement. In some cases of this syndrome the pituitary is at fault, but in the majority the adrenal is the gland that is primarily responsible.

Dr. Kendall's observations are impressive. We have been dissatisfied with the treatment of Addison's disease for two reasons: In the first place, the cost of the cortical hormone on the market has been so high that nobody but the millionaire could afford to have this disease, and because of the cost of the preparation we have not given large enough doses to be effective in all cases. In the second place, the preparations on the market have been of varying potency.

The first step for the chemist in a program to synthesize such a product as this, is its isolation in crystalline purity. When he has taken that step, we can expect him to learn how to make the product. If this synthesis can be completed in the case of cortin, it is to be hoped that the preparation can be placed on the market at a very much lower cost than at present.

The significance of the pituitary in physiology cannot be doubted. Tremendous increase in the knowledge of the functions of this gland has been accomplished recently, and still I am somewhat skeptical about calling this gland a "master gland" as is now the custom. It may be a master gland in physiology, but I question whether it has a comparable importance in pathology and clinical medicine, and I am very doubtful whether our conceptions of metabolic diseases such as hyperthyroidism and diabetes will be altered by the discovery that the pituitary elaborates something which we call a thyretotropic hormone or diabetogenic hormone. I appreciate the influnce of the pituitary in physiological regulations, but I think we must preserve a certain amount of reserve in applying the new knowledge to our clinical problems.

FRACTURES OF THE LOWER END OF THE RADIUS*

CHARLES A. REED, M.D.

Minneapolis

SINCE Colles, in 1841, first described the fracture which bears his name, an amazing number of articles have been written on this subject and it would seem that any further writing must be repetitious. That is largely true but recent studies of end-results are quite disappointing and the lack of unanimity in the treatment advised by the recognized authorities is disconcerting.

The classification of fractures of the lower end of the radius has been sufficiently well standardized. It is a convenience to have the terms Colles' fracture, Smith's fracture or reversed Colles, Barton's fracture or fracture of the posterior joint edge. They are all related fractures. They are the result of the peculiar anatomy and mechanics of this region and an understanding of this fact will largely explain the type of fracture and aid in its treatment.

All of these fractures of the lower end of the radius are due to an end thrust with the wrist bent. An exact end thrust might be conceived such as a blow with the fist but this would hardly cause a fracture in this region. The most frequent cause of such a fracture is a fall on the hand with the hand extended and pronated. When man learned to walk on two feet his fore limbs became beautifully adapted to their prehensile function but they lost their weight bearing usefulness. An involuntary assumption of the quadrupedal posture—in plain English, a fall on the hands—is apt to be disastrous. This violent backward bending of the hand is resisted by the hand flexors and by the volar radiocarpal ligament. The pull of this ligament causes an angulating strain on the end of the radius which is translated into compression strain on the dorsal side and tension strain on the volar side.

The tension on the volar surface of the wrist is resisted by the reinforcing action of the powerful flexor tendon. If they were severed the fracture would open up on the volar side like a fracture of any long bone. In no other part of the body does a similar condition exist, that is, a relatively large cancellous bone reinforced by powerful tendons in intimate contact with the bone. These flexor tendons are automatically rendered tense by the hyperextended position. They tend to prevent the fracture from gaping In the adult bone, which is largely mineral and is relatively resistant to compression strain, it seems reasonable to suppose that the crack starts on the volar side in spite of the flexor tendons. They, however, prevent the bone from opening up wide. They act as a sort of leather hinge and as the hand is forced back, tending to angulate and displace the radial fragment, this fragment is pinched between the carpus and the end of the radial shaft, much as one might crack a nut in the hinge of a door. The fragment is crushed down on the end of the shaft. In children the bone is much less resistant to compression but more to tension and the ordinary fracture in this region is a buckling of the posterior shell of cortex, the anterior shell remaining intact. It is this combined crushing and angulating force which plays havoc with the distal fragment, driving it down onto the more resistant shaft like a cap, impacting the ends and often comminuting the fragment. The type of fracture is determined, it is evident, by the amount of force, the angle at which it is applied and individual resistance. It may vary from a mere crack to complete backward displacement in spite of the restraining flexor tendons.

---

*Read before the Minnesota Orthopedic Society at the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

The triangular fibrocartilage and the radioulnar capsule play a part in the ultimate position of the distal fragment. It will be remembered that the joint cartilage on the end of the radius is continued across the free end of the head of the ulna to form the triangular fibrocartilage, the apex of which is inserted into the base of the ulnar styloid. That portion of the wrist capsule going to the ulna is inserted into the border of the fibrocartilage and then is continued upward to form the radiocarpal capsule. The radiocarpal capsule is a lax structure attached to the radius along the ulnar notch and to the ulna above the head. It is not an orbicular ligament. The radius is held in contact with the ulnar head by means of the fibrocartilage only. The radioulnar capsule must be lax in order to permit the normal rotation of 140 degrees. Consequently when the hand is bent back beyond its physiological limit the carpo-ulnar portion of the wrist capsule attached to this lax capsule exerts almost no strain on the head of the ulna and it is rarely ever broken. The internal lateral ligament of the wrist joint which is attached to the ulnar styloid, however, often causes this to be avulsed. As the radial fragment is forced backward there is nothing to limit this motion on the radial border, but the ulnar border is anchored to the ulna by the fibrocartilage. If this band remains intact, and it is probably not often torn, there is a tendency for the fragment to be rotated on the end of the radius in the sense of supination.

Prognosis.—Not many end-results could be obtained from the literature and those obtained did not check any too well. Edwards and Clayton[3] studied 321 results in King's College Hospital. Their findings were based on a questionnaire filled out by the patient. All who were able to hold down their old jobs were classed "perfect." They found 73 per cent perfect, 23 per cent good and 4 per cent bad. Gasby and Trick[4] in Guy's Hospital examined personally about fifty cases. All without displacement were perfect. Of the rest they found 50 per cent bad, 37.5 per cent fair and 12.5 per cent poor. Dunn[2] made a careful study of fifty cases for Minnesota industrial insurance rating. These were cases from various surgeons. The average disability was 15 per cent. He emphasizes the uniformly bad results from incomplete correction. He thinks 90 per cent perfect reduction should give not over 5 per cent loss of function. Platt,[6] in a comprehensive report, gives no statistics but admits many bad results. Steindler[7] states that disalignment is of importance mainly as a cause of secondary arthritis. Fractures into the joint are prone to cause arthritis even if alignment is perfect.

Diagnosis in a silver fork deformity or a reversed Colles is evident on inspection but intelligent treatment requires an accurate visualization of the fragments and this can only be obtained by means of the x-ray. An examination of a fairly large number of films taken before and after setting showed either that the operators had to do a lot of guessing on some of the x-rays or they were much more skillful than the writer in interpreting x-ray shadows. The anteroposterior views were easy to read and showed the general line of the fracture excellently. The lateral views, which must be depended upon in visualizing the backward angulation and displacement, the impaction, and the twist or supination, were often most confusing. This is due to the fact that the lateral view really is an end view of the distal fragment and is consequently foreshortened. The superimposed ulna may add to the confusion. It is sometimes helpful to repeat the lateral view with about 20 degrees supination and with the tube slightly distal to the true vertical to conform to the obliquity of the joint.

The writer once saw a delivery boy get a fracture from a backfire. He sat down on the running board in evident distress. An extreme silver fork deformity made the diagnosis. Under pretense of examining the wrist a sudden manipulation was carried out taking a fraction of a second. The normal contour returned to the wrist. A temporary splint was applied and the boy instructed to report at once for an x-ray. Four weeks later he showed up. He had worked every day. The wrist was 100 per cent perfect.

This case proves that this boy's clean-cut fracture taken early was easily reduced and that is all it proves. Soon after this a fracture in a seventy-year-old woman was set under gas thirty minutes after her injury. It was set again at three weeks and again at three months. She was finally discharged after seven months with union but with deformity and less than 25 per cent motion in wrist or fingers. Such a case is spoken of as a reproach to the profession. It certainly is a challenge.

Treatment.—The ordinary case without much impaction can be set by any of the recognized manipulative methods. Sir Robert Jones taught the following method, which is probably used more extensively than any other method. The operator places the right hand against the fractured right wrist with the thenar eminence exactly over the distal end of the radius. The operator's left hand is against the back of the patient's wrist with the thenar eminence in contact with the distal radial fragment. The operator's hands are then forced together, at the same time exerting traction and forcing the fragment into flexion and pronation.

With a clear visualization of the displaced fragment as seen in the x-ray, the manipulations necessary for its replacement work themselves out as a logical sequence. First, backward and forward rocking to free the impaction. Then separate the jagged cap-like fragment from the equally jagged end of the radial shaft by leverage against the head of the ulna and by direct traction. Then slide and rotate the fragment forward and into pronation by pressure of the thumbs on the fragment and counter pressure against the end of the radius and the head of the ulna. Then, and not until then, force the fragment downward to completely correct the dorsal angulation. This may require some force if the ends have been badly crushed and misshapen. The hand should then hang by its own weight in full flexion. If it does not, repeat the operation. Full flexion may result in a gaping of the fracture line. Such cases are relatively unstable and require splinting for ten days in full flexion.

The most efficient and comfortable immobilization is obtained by means of the anterior and posterior plaster splint, preferably unpadded. There are now on the market dustless plaster-of-Paris strips 15 inches long that are extremely convenient and make a remarkably strong, light splint. Six or eight of these cut to length are drawn through water and gently kneaded to place. They set very rapidly. They should extend to the knuckles on the back and to the midpalm in front. These plaster shells should never touch each other on the sides.

Haggart[5] believes that Colles' fracture in old people constitutes a very difficult problem. Much crushing is the rule and frequently comminution occurs. He uses prolonged traction in setting with a padded strap above the elbow for counter traction. The splints are applied before the traction is released. He recommends the "sugar tong" splint, which consists of one long strip of plaster extending from the knuckles around the padded elbow to the palm. This splint is used to prevent supination and pronation. He keeps the original splint on five to seven weeks in bad fractures.

Strong traction in setting is advised by many recent writers. Boehler paints the first, second and third fingers and thumb with "mastisol," a glue-like fluid, over which he applies a gauze bandage. The assistant then seizes the thumb in one hand and the three fingers in the other without danger of the fingers slipping. Ten per cent solution of Venice turpentine in alcohol can be substituted for the mastisol. Caldwell[1] gets a grip on the fingers with "finger traps." These finger traps are familiar children's toys which tighten as the pull is increased. Magnuson uses a loop of strong bandage about the wrist, which extends around the operator's shoulder, with which a steady pull can be exerted until the muscles are relaxed. After this the fragments are kneaded into place by direct pressure much as they are by the manipulative method. A careful study of any series of x-rays will show many cases that are so irregular and so comminuted that no simple maneuver without forcible and prolonged traction can be expected to restore the normal relationship of the fragments. When the damage that must have been inflicted on the tendons and their sheaths by the original injury is considered and the possible development of secondary arthritis, 100 per cent perfect results in all cases cannot be expected under any form of treatment.

Summary

Fractures of the lower end of the radius are characterized by crushing of the fragments and frequent destruction of bone structure.

Treatment should be more selective, based on a more careful reading of the x-rays.

Prolonged traction is often necessary for satisfactory setting.

Unstable cases require more efficient and longer splinting than is ordinarily used.

Early movement is most desirable but position must be preserved. Stiffness from disalignment is more persistent than stiffness from long splinting.

Bibliography

1. Caldwell: Device for making traction on fingers. Jour. A. M. A., 96:1126, (April 11) 1931.
2. Dunn: Colles' fractures. Jour. Lancet, 52:162, (March) 1932.
3. Edwards and Clayton: Fractures of the lower end of the radius in adults. Brit. Med. Jour., (Jan. 12) 1929.
4. Gasby and Trick: End-results of Colles' fractures. Brit. Med. Jour., p. 391, (March 2) 1929.
5. Haggart: Treatment of comminuted Colles' fractures in elderly patients. New Eng. Med. Jour., 209:1140, (Dec. 7) 1933.
6. Platt: Colles' fractures. Brit. Med. Jour., (August 13) 1932.
7. Steindler, A.: Fracture disabilities of the wrist. Surg., Gynec. and Obstet., 53:487, (March 15) 1934.

FRACTURES OF THE CARPAL NAVICULAR BONE*

WALLACE H. COLE, M.D., and GEORGE A. WILLIAMSON, M.D.
Saint Paul

FRACTURES of the carpal scaphoid or navicular bone are the most frequent of the somewhat uncommon carpal injuries but with our present knowledge of the symptoms and signs there is little excuse for a failure to diagnose this condition and to institute proper treatment. Radiographs are, of course, essential and necessary for exact diagnosis, but, failing these, the clinical picture is clear enough in most cases to prevent a diagnosis of "sprain" and the subsequent disability which will always follow as a result of improper treatment. The x-ray should be used routinely if possible in all wrist injuries and both antero-posterior and postero-anterior views are necessary in addition to the usual lateral ones if no lesion is to be overlooked. Most mistakes are made, however, not by misinterpreting the radiographs but by failure to use the x-ray at all.

The proper conception for the treatment of navicular fractures can only be obtained by an understanding of the underlying anatomy and pathology and this brief review of such fractures must start with this foundation.

The navicular is located on the lateral end of the proximal row of carpal bones and although it can be palpated for a portion of its extent it is deeply placed between the articular surface of the radius and the distal carpal row, being well protected against direct injury but in great danger from indirect violence. It is held loosely in position by ligaments through which it also obtains its blood supply and is largely bathed in synovial fluid. A thin compact layer surrounding a spongy core makes up the body of the bone, which is narrowed near its middle or neck and has an enlargement on its lateral side called the tubercle to which the lateral radiocarpal ligament attaches.

The exact mechanism and cause of navicular fractures is not absolutely clear but seems to be rather complicated. Violence received by a fall on the outstretched and abducted hand or the jerk of a crank handle in an automobile backfire is transmitted through the capitate bone against the weak or thinner portion of the navicular body, which is locked against the radius, and results in a "snap" type of fracture if the force does not break the radius or is not disseminated otherwise. Injuries received with the hand in adduction may result in the rare lesion where the radiocarpal ligament pulls the tubercle from the body, a true sprain-fracture.

There is no question of the violence required to cause a navicular fracture and the patient remembers, many times only too clearly, the exact time of the injury, the way the violence was applied, and the sudden onset of swelling. These facts should assist in ruling out the presence of congenital bipartite navicularis in cases of questionable old fractures.

---

*Read before the Minnesota Orthopedic Society at the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

Pathologically, as has been stated, there are two sites where fractures may occur: the tuberosity rarely, and the body more commonly. In the tuberosity cases the fracture line is through the region to which the lateral radiocarpal ligament is attached and, therefore, is extra-articular. There is no hemorrhage into the joints, the vascularity of the fragments is good and bony union usually occurs very readily.

When the body is broken the line of fracture passes, as a rule, through the thinnest or weakest point at about the junction of the lateral one-third with the medial two-thirds. It may extend for only a portion of the way across the bone, producing the so-called "green-stick" fracture, or it may be complete. In the former there is no displacement or separation of fragments, the circulation of the bone is practically undisturbed and union is certain.

In the latter type, separation of the fragments is very uncommon unless accompanied by other injuries such as dislocation of the lunate bone or fractures of the radius. There is some difference of opinion in the literature regarding the amount of interference with the blood supply in these fractures and some writers state that the vascularity of the distal fragment is always better than that of the proximal, but this can be questioned, as the bone obtains its blood supply through the ligaments at its ends, and these are very rarely, if ever, ruptured.

Healing is quite typical of that seen in all cancellous bone, depending as it does largely upon the abundance of so-called endosteal callus formation. In experimental fractures the healing response has been found to develop as early as that in long bones but it is more local in its extent and less active. Defects in the surface of the bone or cartilage heal by fibrous tissue as no periosteal bone develops. The fact that the fragments are bathed by synovial fluid does not apparently in any appreciable way affect their healing. It is agreed that the first step in union is the crossing of the fracture line by delicate blood vessels and connective tissue, binding the two fragments together, and that callus develops following this and bony union takes place with the deposition of calcium salts. Inadequate fixation allows motion between the fragments with shearing of these delicate vessels, followed by necrosis and fibrosis of the bone adjacent to the line of separation, and non-union or fibrous union results.

The diagnosis of navicular fractures is based on several correlated factors. A painful wrist, with swelling localized chiefly on the radial side, following a fall on the outstretched hand should always make one think of the possibility of such a lesion.

In most cases a typical history can be obtained of a severe fall on the hyperextended hand or that the backfire of an automobile caused a sudden upward push of the crank against the hand with immediate disability. Seldom is it found that direct blows over the wrist are responsible for these fractures. Loss of grip in the hand, pain on motion of the wrist, particularly in extension, tenderness on palpation in the anatomical "snuffbox" at the base of the first metacarpal, swelling which is limited usually to the radial side of the wrist and does not extend up or down along the tendon-sheaths, absence of deformity, crepitus, and ecchymosis, and a positive reaction to Vaughan's test, which consists of pressure on the third metacarpal in its long axis, producing pain in the wrist in the region of the navicular bone, all point suggestively to the fracture under discussion.

The exact type and location of the fracture can always be demonstrated by x-ray examination although it is frequently necessary, as has been suggested, to have views taken from various angles in order to get the navicular to stand out in proper profile. It is always well to look for carpal fractures when studying radiographs of injuries to the lower ends of the forearm bones or to metacarpals, as frequently these are associated with carpal injuries.

An old fracture of the navicular can very often be diagnosed by the history of persistent swelling of the wrist accompanied by weakness of the grip and pain on attempted motion. The radiograph readily demonstrates the widening of the fracture line due to necrosis and fibrosis or non-union with cavitation. Unfortunately for the patient there has usually been a diagnosis of sprain with inadequate fixation, and an early return to work insisted upon as a result of failure to obtain satisfactory radiographs.

Congenital anomalies occur in the form of the rare "bipartite" navicular bones and these must not be confused with fractures. They are usually bilateral, the divisions are very regular in outline and would hardly confuse one if the possibility of their occurrence is kept in mind. The absence of history of injury assists in ruling out fracture.

The treatment of these fractures, as has so adequately been stated, "is immobilization, immediate, complete and prolonged." If one starts with this knowledge and properly applies it, bony union occurs in almost all cases. All surgeons agree that early fixation is of prime importance, as it allows the delicate network of blood-vessels to develop across the fracture line with no delay or later interference. By far the best method of fixation is the unpadded plaster-of-Paris dressing which can be applied without an anesthetic and changed later if much swelling was present, primarily so that the plaster becomes loosened. The plaster should extend from the palm of the hand to the upper portion of the forearm and must include the thumb to beyond the metacarpophalangeal joint. The hand should be moderately adducted and the thumb in the opposed position. In this dressing the fingers can be moved freely and yet there is absolutely no chance for the navicular fragments to be moved on each other. In the hands of some experienced surgeons a plaster-of-Paris posterior splint extending from the metacarpophalangeal joints to the elbow with the wrist in a slightly cocked-up position has proven ideal. It may be moulded accurately on the skin or over a thin layer of padding so as to produce a perfect immobilization of the wrist and still allow the use of the fingers. This freedom in either method stimulates the blood-supply and prevents atrophy of the bones as a result of disuse, in spite of prolonged fixation.

The length of time a navicular fracture is held fixed must be at least six to eight weeks and the general trend is toward the longer rather than the shorter periods. If this is carried out bony union is obtained in almost all uncomplicated cases. Free motion of the wrist and fingers is obtained at once or within two weeks following the removal of the splint if functional use of the fingers is maintained during the period of fixation.

This rather prolonged but absolutely necessary treatment is entirely different from that followed by earlier writers who advised removal of fixation after a few days for active and passive motion of the wrist joints and resumption of function in spite of pain. Frequent recurrences of painful swelling and loss of strength meant repeated reapplications of splints, a prolongation of disability and fibrous union or non-union.

Old ununited and painful navicular fractures need only be touched upon here. Conservative treatment consisting of prolonged fixation in non-padded plasters for even six or eight months will give a certain number of cures and should always be tried before any operation is undertaken. Removal of one or both fragments always leaves a disabled wrist, although there are times when, on account of extreme pain, this may be necessary. Bone grafting of the fragments has been done with some success but will never be a method of choice for routine procedure and is mainly a surgical stunt.

In closing this very brief discussion of carpal navicular fractures two points must be reëmphasized:

1. All injuries to the wrist, no matter how slight, should be carefully examined for carpal fractures. The x-ray is of the utmost importance in this connection and a diagnosis of sprain should never be made without a clearly negative film to back it up.

2. Treatment must be immediate, and absolute fixation for nearly eight weeks is essential for a proper result. With it, practically all fresh fractures will heal with no residual disability.

MALUNITED FRACTURE OF THE LOWER END OF THE RADIUS (COLLES' FRACTURE) TREATED BY OSTEOTOMY*

HENRY W. MEYERDING, M.D., and LEWIS M. OVERTON M.D.

Rochester, Minnesota

THE majority of fractures of the lower end of the radius are treated with satisfactory results, yet on the fracture service of any clinic one is not infrequently confronted with the problem of treating the disabling deformity which results from malunion of such fractures. Thus in a series of 250 cases of fracture of the lower end of the radius seen at The Mayo Clinic in the last ten years, twelve patients, or 4.8 per cent, presented themselves at the clinic because of malunion with disability. This deformity is almost always due to one of three factors: (1) failure to reduce the fracture properly, (2) failure of the retentive apparatus to hold the fragments in proper position, or (3) failure to immobilize the fracture for a sufficiently long period of time. It will not be our purpose in this study to discuss the primary treatment of these fractures, since this phase has been fully covered by numerous investigators. The report will be entirely limited to the description of a method for correcting a deformity due to malunion and to presentation of the end-results in twelve cases in which treatment was carried out by this method.

In a previous paper one of us (Meyerding)[3] reported a case of malunited Colles' fracture and, about the same time, Ghormley and Mroz included four similar cases in their paper on fractures of the wrist, all of which are included in this study. In a review of the literature we were unable to find any other group of cases of this type in which treatment was by osteotomy. Hoag reported four cases of fracture of the distal end of the radius with deviation of the hand due to shortening of the radius. He treated these fractures by resection of the lower end of the ulna, with satisfactory results. Thornton has offered a method of correcting the deformity in these cases by performing an oblique osteotomy along the line of the junction of the new and old bone. He then removes a wedge-shaped piece of bone from the shaft of radius equal to the length of the osteotomy, and then manipulates the fragments into position. No cases are reported.

Deformity and Disability

The common deformity in malunited fractures of the lower end of the radius is produced by backward tilting as well as by dorsal displacement of the distal fragment (Fig. 1). In production of this deformity, the distal fragment, carrying the wrist and hand backward and upward, produces backward tilting of the joint surface of the radius, radial shortening, and slight supination and deviation of the hand. Malunion will occur unless this displacement is corrected and an approximately anatomic relation produced and maintained until union is satisfactory. Thus, with a malunited fracture, the normal relationship of the carpal-radial articulation is disturbed and motion at the wrist-joint may be impaired.

In the more serious injuries it not infrequently happens that the styloid process of the ulna is fractured and displaced, which results in an increased deformity and disability. It has been our experience that this disability prevents flexion of the wrist and closure of the hand, often resulting in complete loss of income and in permanent, partial disability. Among highly technical workers, the disability is often of serious consequence and, for a musician, stenographer, or machinist, it may necessitate a change of occupation.

Operation

The operation is carried out after application of a tourniquet with the patient under general or brachial block anesthesia. A dorsal incision 1½ inches (3.8 cm.) in length is made longitudinally over the lower end of the radius. Transverse osteotomy is then performed along the line of fracture, extending almost through the bone but leaving a thin layer anteriorly along with the periosteum. Then, by manipulation, the backward displacement is corrected and the radius realigned. This separates the fragments dorsally but leaves them in contact anteriorly. In treating the deformity by this method, the radial shortening is also corrected, thus usually completely restoring the normal anatomic relation between the lower end of the radius and the other structures of the wrist-joint. The new bone which is piled up on the dorsal surface of the radius adjacent to the site of fracture is next removed with a chisel (Fig. 2). This relieves the thickening on the dorsum of the wrist, and the bone which has been removed from this site may be used as a wedge to hold the radial fragments in alignment, if it is deemed advisable. In a few cases no excess bone is present on the posterior surface of the radius, and in these cases the wedge of bone may be taken from the shaft of the radius or from the tibia, if it is thought advisable to use a wedge. However, in the majority of cases, fixation of the wrist in acute flexion will maintain the fragments in correct alignment without the aid of a wedge. After the operation has been completed, the wound is closed without drainage and a plaster-of-Paris cast is applied from the fingers to the middle of the arm, with the wrist in acute flexion and the elbow at right angles. A cast applied in this manner assures complete immobilization and maintenance of the fragments in proper alignment. The cast is usually changed at the end of two or three weeks and the stitches are removed. The second cast is then worn from six to eight weeks longer, although it is usually bivalved earlier to allow active motion and massage. If this is done the two halves of the cast are fastened securely with straps to prevent any possible displacement.

---

*From the Section on Orthopedic Surgery, The Mayo Clinic, Rochester, Minnesota. Read before the Minnesota State Medical Association, Duluth, Minnesota, July 16, 1934.

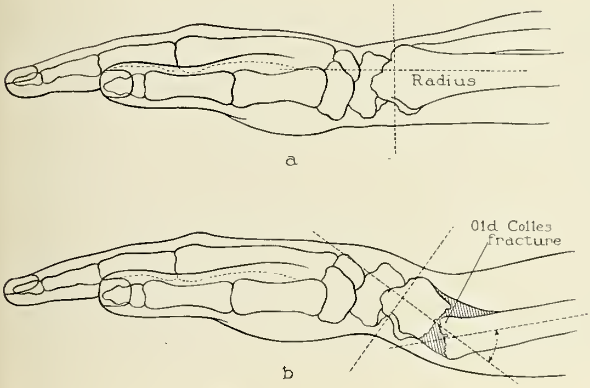


Fig. 1. *a*, Normal relationship. *b*, Old Colles' fracture with malunion of radius, showing dorsal displacement of distal fragment, incongruity of joint, dinner-fork deformity, and formation of new bone.

In some instances it may be desirable to make a ventral incision and do an osteotomy or to remove a wedge of bone to correct deformity, as in Case 12. Physiotherapy is a very useful aid in correcting postoperative stiffness and should be carried on together with active motion. The earlier the patient begins to use the extremity, the sooner will osteoporosis and stiffness be overcome.

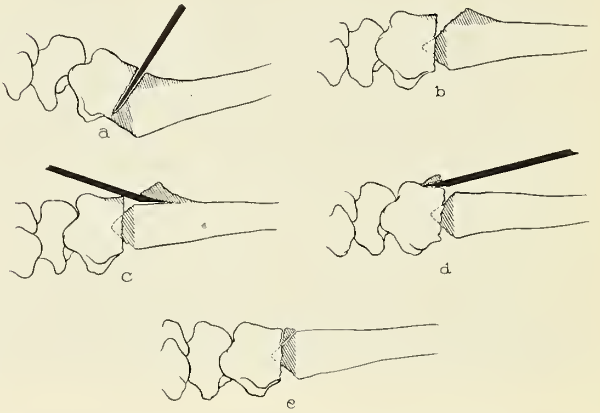


Fig. 2. Osteotomy for malunited Colles' fracture. *a*, Line of osteotomy. *b*, Malalignment corrected. *c* and *d*, Removal of excess bone from proximal and distal fragments. *e*, Malalignment of radius corrected, fragments impacted, and wedge-graft inserted.

Reports of Cases

Case 1.—A woman, twenty-five years of age, was seen at the clinic in February, 1926, because of a malunited fracture of the right radius just above the wrist. There was typical dinner-fork deformity. The fracture was manipulated under anesthesia and splints were applied. When the splints were removed five weeks after the injury, the deformity was noted, the fragments apparently having slipped following reduction. Two months after the injury occurred, osteotomy was performed along the line of fracture and the deformity was corrected. A plaster-of-Paris cast was applied from the fingers to the middle of the humerus with the wrist in acute flexion. The patient made an uneventful recovery and an excellent result was obtained (Fig. 3).

Case 2.—A woman, twenty-one years of age, came to the clinic February 26, 1927, because of a fracture of her left wrist. The injury had occurred one month previously. At that time, the fracture had been manipulated under anesthesia and splints had been applied. The patient had come to the clinic because the deformity had persisted. Examination disclosed an old malunited fracture of the left radius just above the wrist with dorsal and upward displacement of the distal fragment. The wrist was displaced backward, preventing flexion of the hands and closure of the fingers. At operation, osteotomy was carried out along the old fracture line and the fragments were manipulated into position. A plaster-of-Paris cast was applied from the fingers to the middle of the arm with the elbow at right angles and the wrist in 60° flexion.

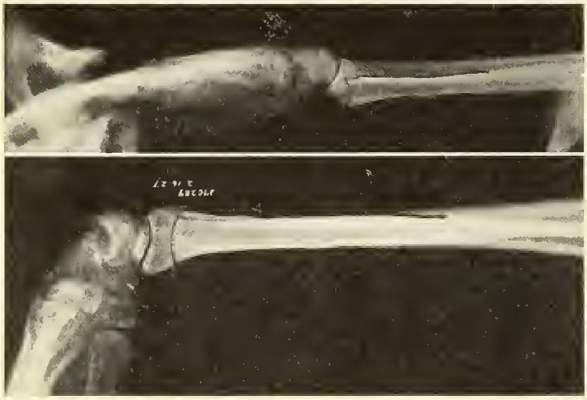


Fig. 3. *(Above)* Malunited Colles' fracture two months after injury. *(Below)* Postoperative result following osteotomy of the radius.

Recovery was uneventful and an excellent result was secured (Fig. 4).

Case 3.—A widow, fifty-two years of age, was admitted to the clinic August 24, 1927, with an infected compound fracture of the lower end of the right radius; this had occurred seven weeks previously. Examination revealed two draining sinuses over the right wrist and a fracture of the lower end of the radius in malposition. The wrist was dislocated ventrally and the lower end of the ulna was also dislocated. The patient was returned to the care of physicians at her home until all infection had disappeared. Two months later the wounds had healed, but the patient did not return until six months after her previous dismissal. At this time she was unable to move the wrist or to close her fingers. At operation, the lower end of the dislocated ulna was removed and an osteotomy of the radius was performed from the ulnar side. The deformity was then corrected as much as possible. A large block of bone on the ventral surface of the radius was then removed through an anterior incision. A plaster-of-Paris cast was applied from the middle of the arm to the fingers. There was a little serous drainage from the wound, but otherwise recovery was uneventful. A fair functional result was obtained. The wrist remained stiff, but extension of the fingers was normal and flexion about 80 per cent of normal.

Case 4.—A business man, twenty-four years of age, was admitted to the clinic September 3, 1927, because of a deformity of the right wrist resulting from a fracture which had occurred six weeks previously. Examination disclosed a malunited fracture of the distal end of the right radius and dislocation of the lower end of the ulna with dinner-fork deformity. At operation, osteotomy was performed along the line of fracture. The fragments were then manipulated into excellent position and held there by a beef-bone plate. The dislocation of the lower end of the ulna was reduced. A plaster-of-Paris cast was applied from the fingers to the shoulder with the elbow at right angles and the wrist flexed. Excellent position was obtained. The patient was allowed to go home, at his request, at the end of three weeks after having had the cast changed and the stitches removed.

Case 5.—A child, ten years of age, was admitted to the clinic September 12, 1927, because of a fracture of the lower end of the left radius and ulna, which had occurred two weeks previously. The family physician had been unable to reduce the fracture. Examination revealed a fracture of both bones of the left forearm. The callus and displaced fragments were separated with a chisel and manipulated into position. A plaster-of-Paris cast was applied with the wrist in flexion. Recovery was uneventful and an excellent result was obtained.

Case 6.—A farmer, twenty-eight years of age, came to the clinic October 18, 1927, complaining of a deformed left wrist. Seven years previously he had fractured this wrist. At that time two attempts had been made to reduce the fracture but without success and, as a result, the fragments had healed in malposition. Examination disclosed the old malunited fracture of the distal end of the left radius. Dinner-fork deformity was present. All movements of the wrist and hand were markedly limited. There was considerable shortening of the radius. At operation, osteotomy was performed along the old fracture line and the deformity was corrected. This partially relieved the radial deviation of the hand. A cast was applied with the wrist in flexion. Two weeks later the lower end of the ulna was resected. This completely corrected the radial deviation. Convalescence was uneventful and the patient secured a very good end-result.

Case 7.—A school boy, sixteen years of age, came to the clinic August 20, 1928, because of a deformity of the right wrist. He gave a history of having fractured the wrist eleven months prior to his admission. The fracture had been reduced at the time but the splints had had to be removed because signs of ischemic paralysis had appeared. Later, a second attempt had been made to reduce the fracture, but without success, due to infection. Examination disclosed the old fracture of the lower third of the right ulna and an epiphyseal separation of the lower end of the radius, both of which were malunited. There was marked posterior angulation of the epiphysis. The patient was unable to flex the wrist or to close his fingers. At operation, ½ inch (1.3 cm.) of the distal end of the ulna was excised and the fragments were fastened with a beef-bone screw and chromic catgut. Osteotomy was performed along the fracture line of the radius, and the deformity was then corrected. The piece of bone, which had been removed from the ulna, was inserted as a wedge to hold the radial fragments in position. A cast was applied with the wrist in flexion. A mild, soft-tissue infection occurred, but this cleared up promptly. An excellent result was secured.

Case 8.—A boy, ten years of age, was admitted to the clinic January 5, 1928, because of a deformity of the left wrist. He gave a history of having injured the wrist one month previously. An osteopath had made a diagnosis of fracture and had applied splints for three weeks. Examination revealed an epiphyseal separation of the lower epiphysis of the left radius in malposition. The lower fragment was displaced backward, producing dinner-fork deformity. At operation, a ventral incision was made and the lower end of the radius exposed. Osteotomy was performed and the epiphysis was brought down into the correct position. A plaster-of-Paris cast was applied with the wrist in flexion. Healing took place by primary intention. An excellent result was obtained.

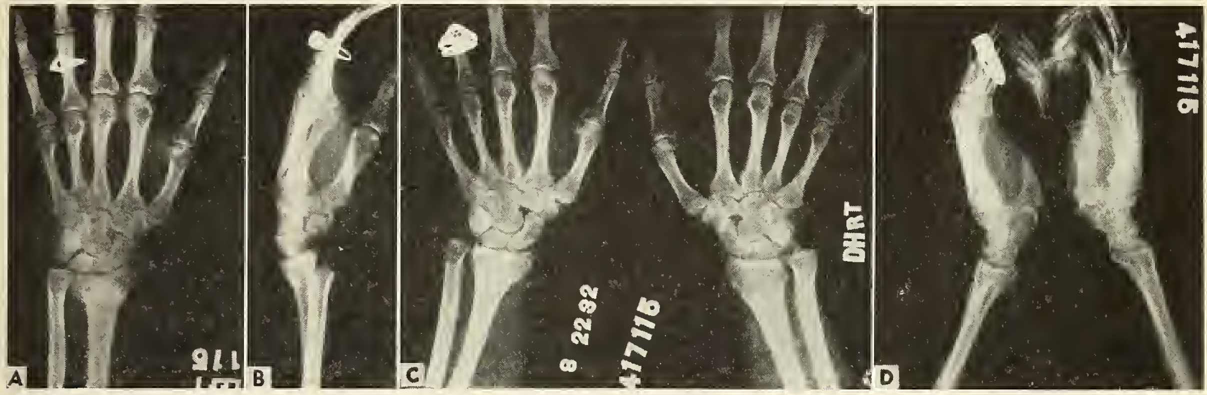


Fig. 4. *a,* Anteroposterior roentgenogram showing radial shortening and fracture. *b,* Lateral roentgenogram showing backward and upward displacement. *c,* Anteroposterior roentgenogram showing postoperative results after five years. The normal right wrist may be compared with the fractured left wrist on which osteotomy had been done. *d,* Lateral view.

Case 9.—A woman, twenty-three years of age, came to the clinic December 23, 1929, complaining of a disabling deformity of the right wrist. The wrist had been fractured six months previously. Three unsuccessful attempts had been made to reduce the fracture. On examination, an old malunited fracture of the distal end of the right radius was found. The distal fragment was displaced backward, making it impossible to flex the wrist or to close the hand. Osteotomy was performed through a dorsal incision at the site of the fracture. A plaster-of-Paris cast was applied with the wrist in acute flexion. This cast extended from the fingers to the middle of the arm. The patient made a normal convalescence and secured an excellent end-result.

Case 10.—A school teacher, thirty-one years of age, was first admitted to the clinic June 16, 1930, complaining of a deformity of the left wrist with an associated disability. She gave a history of having fractured the wrist two years previously. The fracture had been reduced, but a blow, occurring two days after the injury, had reproduced the deformity. Examination disclosed an old malunited fracture of the distal end of the left radius. There was typical dinner-fork deformity with an inability to flex the wrist and to close the fingers. At operation, an incision was made along the dorso-lateral surface of the wrist. Osteotomy was performed on the radius about ½ inch (1.3 cm.) above the wrist-joint. The fragments were manipulated into position and a wedge-shaped piece of bone from the tibia was inserted between the separated fragments. A plaster-of-Paris cast was applied with the wrist acutely flexed and in ulnar deviation. The patient made an uneventful recovery and an excellent result was obtained.

Case 11.—A school teacher, forty-two years of age, was admitted to the clinic November 28, 1930. She gave a history of having fractured her right wrist five weeks previously. Immediately after the injury her local physician had reduced the fracture and applied splints. On removing the splints four weeks later, the deformity had still been present. Examination at the clinic disclosed an old malunited fracture of the right radius, just above the wrist. The wrist was displaced dorsally and there was inability to flex the wrist and to close the fingers. Osteotomy was performed along the old fracture line and the fragments were manipulated into position. A plaster-of-Paris cast was applied with the wrist in palmar flexion. There were no postoperative complications. An excellent result was obtained.

Case 12.—A business man, fifty-four years of age, came to the clinic September 16, 1931. Eleven months prior to admission he had been seriously injured. Among other injuries were fractures of the left radius and ulna just above the wrist. The arm was manipulated and a cast applied without the aid of an anesthetic, since the patient was unconscious and there were injuries to the thorax. When the cast was removed twenty days later, a dinner-fork deformity was present. Examination revealed old malunited fractures of the lower ends of the left radius and ulna. The distal fragments of both bones were displaced backward. There was inability to close the fingers and to flex the wrist. At operation, it was decided that ventral-wedge osteotomies on both the radius and ulna would be the most simple method of correcting the deformity.

Accordingly, wedged osteotomies were performed on the ventral side of both bones. When this had been done, the deformity was very easily corrected. A plaster-of-Paris cast was then applied with the wrist in full flexion. The patient made a normal convalescence and obtained an excellent end-result. This case has been reported previously.[3] The end-result was not given at that time.

Comment

Malunited fracture of the lower end of the radius produces a deformity which is usually painful and one which is almost always quite disabling. The severity of the disability often forces the patient to give up his former occupation, and unless the disability is relieved, he will likely become dependent on society. In order to restore function of the extremity, the deformity must first be corrected. After the deformity has been corrected, the disability will clear up unless some previous complication prevents the return of normal function. Such complications may result either from infection or from simple contracture of the joint capsules or muscles, the latter being due to the existence of the deformity over a long period of time. Simple contracture usually can be corrected by exercise and by massage, whereas changes which occur secondary to infection will always persist to a varying degree depending on the severity of the infection.

The operation described in this paper has given uniformly good results in the cases in which it has been used. A review of the cases reported will indicate that excellent results were obtained in ten of the twelve cases. The fracture was compound in one of the other two cases. In this case, a preëxisting severe infection had developed which had resulted in ankylosis of the wrist joint and in stiffness of the fingers. However, correction of the deformity was followed by a return of function of the fingers to within 20 per cent of normal. In the other case the result is indeterminate as the deformity was completely corrected by osteotomy and the patient was allowed to go home wearing the cast. He removed the cast himself without consulting a physician and our information regarding the result is unsatisfactory.

The results in cases of malunited fracture treated by osteotomy, as described in this study, have been encouraging. The procedure is simple and involves very little risk. We believe it to be a very useful procedure in treating the quite disabling deformity which occurs in malunited fractures of the lower end of the radius.

Bibliography

1. Ghormley, R. K., and Mroz, R. J.: Fractures of the wrist: a review of one hundred seventy-six cases. Surg., Gynec. and Obst., 55:377-381, (September) 1932.
2. Hoag, Carl: Resection of the distal end of the ulna for shortening the radius following fracture. Calif. State Jour. Med., 21:1-3, (January) 1923.
3. Meyerding, H. W.: Malunion of the radius and ulna preventing closing of the hand and flexion of the wrist. Surg. Clin. N. Amer., 12:874-875, (August) 1932.
4. Thornton, Lawson: A plastic operation for reduction of old transverse fractures of the distal end of the radius, healed with displacement and deformity. Surg., Gynec. and Obst., 42:844-845, (June) 1926.

ACUTE FRACTURES OF THE SPINE*

C. C. CHATTERTON, M.D.

Saint Paul

Acute fractures of the spine may be divided into various types. Fractures may be classified according to anatomical portion of the vertebra involved, such as the body, neural arch, and its processes, or as to whether the fracture is accompanied by cord injury. Again, fractures without cord injury may also be subdivided according to the type of lesion, as: compression, split, depressed; or as simple or comminuted, depending upon the anatomical part of the vertebra affected.

In this short paper dealing principally with the treatment, it is quite impossible to describe at any length details of the pathology or etiology of any special type of fracture except that of compression of the body of the vertebra, which constitutes about 80 per cent of the injuries of the spine proper.

---

*Read before the Minnesota Orthopedic Society at the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

A review of the reports of several authors shows that approximately half of the cases of compression fracture involve the first lumbar vertebra; 25 per cent more are of the eleventh and twelfth dorsal or the second lumbar vertebra; 5 per cent more include the remaining portion of the cervical, dorsal and lumbar spine. Fractures of the cervical spine are usually of the split type of body and neural arch and rarely of the true compression type. The high dorsal spine is rarely involved and then frequently more than one vertebra is affected. The lower lumbar vertebra are occasionally involved in compression but more frequent the damage is to the facets, transverse or spinous process.

Compression fractures are of frequent occurrence and are often seen after trivial injuries. Cases are reported where sudden muscular contraction of spinal muscles has caused definite compression.

It is well known that any injury causing sudden and acute flexion of the spine, the so-called jack-knife position, so frequently occurring in automobile accidents, falls upon the buttocks, blows from heavy objects striking the back while in a flexed position, and injury from tobogganing or riding in a roller coaster are prone to cause compression fracture.

Symptoms of Compression and Diagnosis

In uncomplicated injuries the diagnosis is usually not difficult. A feeling of weakness in the spine may be the only complaint, but usually pain of a dull, nagging, local or referred type persists from the onset of the injury.

Examination of the spine shows limited motion, muscle spasm and rigidity, with or without deformity, usually of the knuckle or kyphotic type at the site of the injury. Definite tenderness is found on pressure over the spinous process and around the vertebræ affected. Abdominal distention, mild or severe, usually is seen after such an injury of any severity, although it may not become a prominent symptom until hours later or after manipulation.

X-ray in anterior and lateral planes is indicated following any spinal injury and it should be assumed that a patient has a compression fracture even following a trivial forced flexion of the spine until proven otherwise.

In complicated cases, the pain and suffering from other injuries or fracture may mask the spinal injury so that trivial pain and symptoms caused by compression may be easily overlooked. An early examination by x-ray after such injury is by far the safest rule.

Principles of Treatment

The principle of treatment in compression fracture of the spine is like that in other fractures: to reduce deformity to a minimum, to prevent ankylosis in neighboring joints, to break up impaction and cause broken ends to come into end-to-end position. Of all fractures a compressed body of a vertebra is perhaps the only one that has a marked tendency to correct itself by hyperextension and rest alone, and this may account for the many methods of treatment, which vary from a few days rest in bed to the extreme of spinal fusion by operation. The end-result I believe may not depend so much upon how the hyperextension of the spine is accomplished but upon a correction of the pathologic change which has taken place in the vertebræ.

The body of the vertebra, made up of cancellous bone filled with blood vessels, must, if marked compression is allowed to remain, sustain a marked damage to the blood supply to a considerable part of the area compressed. Shortening will occur as in an impacted Colles' fracture through absorption of bone if the impaction is not relieved, but if the fragments are pulled apart, new bone fills in the gap with a much better result.

The only chance of restoring the compressed vertebra and avoiding deformity is by hyperextension early and complete.

Surely hyperextension of the spine is the reverse of the force that caused the compression. The shape of vertebra with its posterior facets to pry and rest on as well as the ligamentous attachments to the anterior portion of the body of the vertebræ make good reduction possible in the largest percentage of cases. The surgeon, of course, cannot be blamed for marked interference with circulation to the body of the vertebræ with resulting atrophy, but with reduction of deformity certainly these changes are less likely to occur.

Treatment

How the hyperextension is obtained is of minor importance as long as it is accomplished.

This type of fracture does not demand expensive apparatus for its successful treatment and sufficient material is at hand in any hospital or farm house, provided the surgeon supplies felt padding and plaster-of-Paris bandage.

During the last decade there have appeared in the literature descriptions of many methods all involving the same principle. These include simple rest in bed followed by early massage, a special type of bed which can be adjusted to the desired angle, the Bradford frame, blanket tossing, plaster shells and braces to be used after manipulation.

Rest on a flat bed in any degree of compression fracture does not meet the indication in that it does not correct the deformity. It may, however, be used for slight chip fractures. Without restraint the patient is difficult to control and may flex his spine.

Special beds (Rogers bed) will hyperextend the spine and may correct the deformity but it is often very difficult to keep a patient down the required length of time in such a bed. The Bradford frame of sanitary type properly hyperextended with ties to keep patient in position is better than a bed.

Manipulation

Tossing the patient in a blanket face down will hyperextend the spine but is rather an inaccurate method of applying force to the area affected. Some apparatus such as a plaster shell, or rest on a hyperextended bed after manipulation, is also required.

It is my belief that best results will be obtained when the amount of hyperextension and force to produce it is under the control of the surgeon and retention apparatus is then applied to maintain the position. This can be accomplished by a simple apparatus within the reach of every physician wishing to treat compression fractures.

1. Forcible manipulation on box or chairs and application of plaster jacket.

Assistants are needed to hold the patient's arms and legs. The patient is placed with the upper chest and chin and the thighs on boxes or chairs. The surgeon manipulates the affected area with his hands. A plaster jacket is then applied to the patient in hyperextension from armpits to symphysis pubis.

2. Hammock manipulation.

The patient is placed upon the abdomen on a canvas sheet or grain sack cut at the edges. This is allowed to sag until with gentle manipulation extreme hyperextension is produced. Then a jacket is applied over the patient and canvas sheet.

3. Suspension by canvas bandage.

The patient is suspended by an eight to ten inch bandage placed over the back, padded with half-inch felt, until the heels and head rest on table. A plaster jacket is then applied with the patient hyperextended.

The plaster jacket is applied from the armpits to the symphysis pubis. The plaster is well moulded over the pelvis and fracture site and a large window is cut over the abdomen to allow for the abdominal distention which frequently occurs, and this open area tends to increase the desired hyperextension. Anesthesia is occasionally used during the manipulation but most frequently a morphine hypodermic will give relaxation enough and relieve pain so that hyperextension can be accomplished.

After-Care

Usually after hyperextension and the application of a plaster jacket the first few days are stormy. Distention and vomiting often may be distressing, but usually respond to symptomatic treatment. After a week the plaster is bivalved and, with the patient resting in the anterior half, massage and heat to the spine are given and active contraction of spinal muscles allowed.

The patient may be up and about under supervision wearing a plaster corset usually for six or eight weeks. Much depends on the shape and size of the bodies of the injured vertebræ as noted in check-up x-rays.

After eight weeks a light brace or spinal support may be used while the patient is up, continuing with the posterior half of the plaster shell at night. Massage and baking, muscular contraction and lessons in posture are continued at least four weeks after the removal of the plaster jacket.

The back brace is continued from four to six months from the date of injury, and the patient is warned to constantly keep on with the hyperextended position during this time. The sitting position with the dorsal lumbar spine straight is to be especially avoided.

If this simple system is faithfully carried out by patient and physician, the greater number of cases will result in a spine permitting hard labor and one need not expect deformity, ankylosis, nerve root pain, or early arthritis as the end-result of compression fracture.

TREATMENT OF FRESH FRACTURES OF THE HIP*

MYRON O. HENRY, M.D.
Minneapolis

DURING these years of depression the standards demanded by the public for good functional results in fractures have unquestionably risen. When progress in the treatment of fractures is unsatisfactory or when a poor functional result seems imminent, the patient and his relatives (and frequently his lawyers) scrutinize and criticize the physician's work. Nowadays the radiographs, which seem to be the most essential factor in the management of fractures, are read and passed upon by the laity. It is therefore incumbent upon the physician to employ the method of modern treatment which, in his best judgment, will yield the best result under the conditions at hand.

The term "acute fractures of the hip" usually brings to mind that bête noire of all fractures—the intracapsular fracture—and a brief consideration of the various methods now available for treatment of these fractures should be of value.

Closed Methods

1. The oldest and best known of the closed methods of treating intracapsular fractures of the hip is by simple adhesive traction. While this form of treatment remains the method of choice in a few cases, the weight of modern opinion is steadily narrowing the field of its application. Occasionally the surgeon *must* ignore the fracture and treat the infirmities of age, but this is rarely necessary. The Buck's extension method is painful, exhaustive, and crippling.[4] Very few patients are too feeble to stand a cast, and one is often surprised at the comfort these frail, feeble patients find in a properly applied cast.

2. The Carl Jones traction device has many supporters because it allows the patient to sit up at will. The merits claimed for it are simplicity of application and painless reduction. This appliance employs the Hoke principle of counter traction exerted against the sole of the sound foot. The dorsum of the foot and the malleoli of the injured side carry the burden of the traction, which is exerted powerfully by a screw. The splint was originally designed as a temporary transportation splint, and it serves admirably for this purpose. Considerable skill in handling plaster is necessary for its successful application, for if the casts are heavily padded they slip and produce pressure sores in spite of the padding. The successful use of this splint depends upon a well fitting cast and upon partial release of the traction after the fracture is evidently reduced. My patients objected to the position of the extremities and complained of strain in the knees.

3. The "Roger Anderson Well Leg Counter Traction Splint" has been widely offered to the profession for treatment of these cases. By skeletal traction this splint powerfully applies the principles of Hoke traction. Although this splint exerts traction more efficiently than the Carl Jones device, it does employ skeletal traction which requires strict aseptic technic, and on this account its application is more limited.

4. The Whitman abduction method has almost become routine in the treatment of intracapsular fractures of the hip. In this method traction is applied to both lower extremities on a fracture table, as is well known. Less well known are the important steps of lifting the upper thigh forward and pulling it slightly laterally before rotating the extremity inward. This maneuver disentangles the fragments. Abduction is the *last* step and does not reduce the fracture but holds the fragments in position. With the advent of lateral x-rays of the hip we now recognize that many of these fractures are not completely reduced. They must be reduced before the abduction cast is applied.

5. Thomson's modification of the Whitman cast maintains abduction more efficiently. In this method the thigh on the sound side is abducted and included in plaster to the knee. If such a double spica cast is properly applied and reinforced with the strut, the lower chest need not be included but only the iliac crests, which allows the patient to sit up part way.

---

*Read before the Minnesota Orthopedic Society at the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

6. Cotton's Artificial Impaction adds still more to the Whitman-Thomson method, but probably should not be employed until the surgeon is reasonably certain that the fracture is reduced.

7. Leadbetter's Method[5] is the most efficient of the closed methods available today and should be more widely used. It is similar to Gaenslen's method and really reduces the fracture. The steps of the manipulation are as follows:

"The pelvis is fixed on a fracture table by an assistant and under moderate manual traction (with the knee flexed) the hip is slowly flexed to 90 degrees, then the slightly adducted thigh is lifted directly upward (*i.e.*, vertically, to correct posterior displacement and shortening), then gently rotated inward 45 degrees to engage the fragments. During this maneuver an assistant pulls the thigh laterally to clear the inner fragment and line up the two fragments by tension on the capsule.

"When the fragments are felt to be engaged, the hip should be circumducted into abduction and extension and the opposite thigh should be fully abducted."

A fractured hip successfully reduced by any method should fulfill Leadbetter's requirements for reduction:

"1. Full abduction (equal to the sound side) can be obtained and maintained without undue force.

"2. The hip should be *stable as regards length* in a position of full abduction, *i.e.*, no traction necessary to prevent recurrence of shortening.

"3. In a position of full abduction the hip should be stable as regards rotation." This is the crucial test, and Leadbetter insists that a hip is not completely reduced which does not maintain its position supported on the open palm. Leadbetter's "palm test" should be applied to every case after manipulation.

As our knowledge of the pathology of these cases improves, and we study them in two planes by lateral x-rays, we realize that many cases which we formerly considered to be perfectly reduced were really inadequately reduced. Most cases of non-union are due to incomplete reduction and many are due to failure to maintain the reduction. However, there are still some cases of non-union in which reduction was complete and was efficiently maintained throughout the normal healing period. Because closed methods fail in such cases there is a definitely increasing inclination toward open surgical attack. While it seems unlikely that open operative methods will ever come into general use, the improved results reported to date indicate that capable surgeons are undertaking operative procedures more frequently.

Open Methods

1. Albee recommended his tibial bone graft for these cases in 1913. His operation is excellent but requires three incisions and unusual operative skill. The operation, perhaps, had best be reserved for cases of delayed or non-union.

2. Smith-Petersen[7] devised a three flanged nail to secure impaction and internal immobilization in these cases. In his series bony union was secured in 86 per cent of the cases—a distinct improvement over the results usually obtained by closed methods. The operation requires considerable operative skill, but Westcott[8] has devised a protractor to simplify accurate introduction of the nail. Henderson, too, has introduced the nail more accurately along a Kirschner wire as a guide.

3. Magnuson's operation[6] of reaming out the distal side of the head and freshening the neck of the femur seems better suited to cases of delayed or non-union.

4. In the same category is Bozsan's[1] operation of drilling into both sides of the exposed fracture to re-establish increased circulation.

5. Hey-Groves of Bristol, England, reported a means of "proximal pegging" in 1929.

6. Ellis Jones[3] devised a trochanteric graft for these cases. His exposure overcomes many objections to the blind pegging type of operation.

7. A rustless steel screw-bolt has been devised by the author[2] to secure and maintain reduction in these cases. It is introduced from the trochanteric side to hold the head of the neck and can be removed easily if desired.

Method of Choice

Operative methods should, of course, be reserved for patients who are good operative risks and should be employed only by capable surgeons in well equipped orthopedic operating rooms. The average conservative surgeon will probably do best to perfect his application of the Whitman or Leadbetter method. After he has reduced the fracture carefully and before he has applied his cast, the surgeon should have x-rays—both antero-posterior and lateral views. Satisfactory lateral views can be made with the average portable x-ray outfit. If the reduction is not complete and satisfactory, certainly a second attempt should be made to make it so. Usually there is no real reason why a second attempt should not be made to obtain a perfect reduction.

Bibliography

1. Bozsán, E. J.: New treatment of intracapsular fractures of femur. Jour. Bone and Joint Surg., 30:884, 1932.
2. Henry, Myron O.: Intracapsular fractures of the hip. A new device for osteosynthesis. Jour. Bone and Joint Surg., 16:168, 1933.
3. Jones, Ellis: Trochanteric transplantation in treatment of fractures of neck of femur. Jour. Bone and Joint Surg., 30:259, 1932.
4. Key, J. A., and Conwell, H. E.: Fractures, Dislocations and Sprains. C. V. Mosby Co., 1934.
5. Leadbetter, Guy W.: Treatment for fracture of neck of femur. Jour. Bone and Joint Surg., 15: 931, 1933.
6. Magnuson, P. B.: Repair of ununited fracture of neck of femur. Jour. Am. Med. Assn., 98:1791, 1932.
7. Smith-Petersen, M. M.: Intracapsular fractures of neck of femur. Arch. Surg., 23:715, 1931.
8. Westcott, Heywood: A method for internal fixation of transcervical fractures of the femur. Jour. Bone and Joint Surg., 16:372-378, (April) 1934.

TREATMENT OF NON-UNION FRACTURE OF THE HIP*

EDWARD T. EVANS, M.D., F.A.C.S.
Minneapolis

THE time allotted to a discussion of this phase of our symposium precludes any detailed discussion of cases or lengthy analysis of the factors causing non-union.

We have just heard an excellent presentation of the closed method of caring for the fresh fracture of the neck of the femur.

Many of you know that I have long championed the Whitman method of abduction, internal rotation fixation of the fresh fracture and have taken exception to the criticisms directed against the method because I felt that an analysis of end-results in that treatment should be predicated upon a properly proven initial reduction. No one would report a series of one hundred cases of Pott's fracture and advocate a method of reduction if 40 per cent of the reductions were inadequate. Yet I have seen case after case of fractured neck of the femur supposedly treated by Whitman's method in which the lesser trochanter was not lost to view by the internal rotation. The method receives the blame when the stigma should be on the operator's faulty application of the method.

We now have a method of proving this contention—the curved cassette as used by George and Leonard of Boston, which gives us the all-important lateral view of our reduction. Their series is the actual proof. Forty consecutive cases, proven by antero-posterior and lateral post-reduction views to be correctly reduced, gave thirty-eight unions and only two non-unions, in which two some question as to the careful postoperative retention of position arose. The series is small but one conclusion may, I believe, be safely drawn: with proper reduction, and proven reduction, non-union in the hip should fall well under 10 per cent as compared to the old 40 to 60 per cent.

This method of check also gives us an opportunity to discover those obviously unreducible fractures in which we should be able to early determine the indications for open reduction—let us say within a week. Such open reduction should then utilize a fixation peg of bone graft or a metal nail of the Smith Peterson type or the Henry screw.

Given a case of obvious non-union certain fundamentals must be considered before determining our course. Does the patient's age preclude active treatment? Has the patient pain or is it obvious that he will develop pain? If so, a well fitting Thomas ring caliper may give him stability enough to get along well until a short or at least tough fibrous union permits a fair degree of function with comfort.

---

*Read before the annual meeting of the Minnesota State Medical Association, Duluth, June 16, 1934.

Every case of non-union is an entity which needs individual study as to the proper procedure. The essential disability is painful instability. The essential of treatment desired is painless stability. This instability is due to loss of the fulcrum of weight bearing at the hip and may be increased by the tangential strain upon the fracture line.

The simplest surgical procedure to correct this is the low Schantz osteotomy which has been long advocated in Continental clinics and more recently by Gaenseln of Milwaukee. Abduction and apparent length is obtained, stable weight bearing against the pelvis is secured and occasionally union occurs by reason of the loss of tangential strain at the fracture line.

The procedure carries little risk, a morbidity of about four months and early weight bearing is allowed with protecting caliper or short hip spica. Occasional non-union has been known to occur at the osteotomy site.

Given a viable head, one should consider the Brackett operation, which is essentially the freshening of the fracture surfaces with interposition of the remodelled neck and great trochanter into the scooped out head. This procedure should be used early, prior, of course, to the death of the head. The morbidity of this procedure is prolonged until union occurs and carefully protected weight bearing for a considerable time thereafter is essential. The production of a short neck by the operative procedure may result in some troublesome shortening and loss of ranges of motion due to mechanical limitation.

With the exception of those cases in which the physical condition of the patient or the existence of a not too troublesome fibrous union precludes operation and those cases in which Schantz osteotomy is indicated I have had the best results from the Whitman reconstruction operation.

This procedure removes the head, often not viable, transposes the great trochanter with its muscles attached down the shaft for new purchase power and remodels the stump of the neck so that a marked disproportion between remodeled stump and acetabulum precludes ankylosis. A fascial flap may or may not be turned over the raw surface of the neck, as Kleinberg suggests, though I have found this necessary in only one case.

The morbidity in hospital is less than six weeks. Weight bearing is begun early at two to three weeks with protective spica. Stability is assured. Painless weight bearing results in from three to six months and a surprising amount of mobility is present in the majority of coses.

Conclusions

1. The best preventive of non-union is proper proven reduction.

2. Non-union should not then be so frequent as formerly.

3. Open reduction *per se* should be done early when indicated.

4. Protective weight bearing by Thomas ring caliper is desirable in the feeble and aged.

5. Stability is the aim of operative treatment.

6. The Schantz osteotomy is a conservative operative treatment which gives excellent results.

7. The Whitman reconstruction operation is a major operative procedure which best satisfies the criteria of a good result.

FRACTURES OF THE SHAFT OF THE TIBIA AND FIBULA*

JOHN H. MOE, M.D.

Minneapolis

FRACTURES of the shaft of the tibia and fibula may be simple and without appreciable displacement. Such fractures are easy to treat and require only to be splinted by means of a cast until they heal. There are some points of importance in their management. X-rays should include the entire leg, as low fractures of the tibia are often associated with a break in the upper end of the fibula. In all fractures above the lower third of the leg it is best to include the knee in the plaster. In older people, if a window is cut over the knee and the patella is actively and passively moved daily, stiffness of the knee is largely prevented. A U-shaped "walking iron" of the Boehler type is incorporated in the cast, projecting not more than three-quarters of an inch below the heel, and the foot is held at right angles. With transverse fractures, walking without crutches can be started within a week. In oblique fractures, full weight bearing had best be delayed for a month. The position of the fragments should be checked by x-ray in two weeks and in a month, as slipping of the fragments within the cast can occur. In children, the cast may be removed in six or eight weeks, and usually no further support is necessary. In adults, firm union requires from two and one-half to four months or longer. The amount and quality of callus as shown by x-rays is the best criterion in determining the time for removal of support. In case of doubt, it is well to reapply a light cast extending to the knee, or to fit the patient with a caliper brace with a long fitted cuff support. Swelling of the ankle following removal of the cast is minimized by generous adhesive strapping. If early weight bearing has been instituted, stiffness and swelling of the ankle is not marked. Full functional recovery should be the rule in from four to six months in an adult.

---

*Read before the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

Displaced fractures of the shafts of the tibia and fibula offer a real problem of treatment. They are often comminuted and not infrequently compounded. Nerve and vessel injury may occur. Shock is not infrequent.

Reduction is made very much easier if the fracture is splinted and temporary traction applied at the place of accident, and if the reduction is completed at the earliest possible moment. After several days have elapsed reduction is much more difficult.

Many forms of treatment are advocated, from simple manipulative reduction and application of a cast, to open reduction and internal splinting. The intelligent use of skeletal traction methods has made these fractures much less formidable, and probably is the method of choice in the majority of cases.

Transverse fractures, particularly in children, can often be reduced by simple manipulation and traction. Under general or spinal anesthesia, the patient is placed on the Hawley fracture table, and a traction cuff of muslin bandage is looped about the ankle over thick felt pads. Screw traction is applied, the shortening overcome, and the fracture manipulated manually until reduced. The reduction is checked by portable x-ray, and a cast is applied from above the knee to the ankle. This is allowed to harden. The traction is removed, and the cast extended to include the foot, care being taken to keep the foot at right angles. Another x-ray is taken, and if the position has been maintained a walking iron can be applied.

The oblique or comminuted fracture can seldom be kept in good position by such means. It is in these types that skeletal traction or distraction methods are efficient. Skeletal traction is not difficult to apply. With rigid asepsis, infection practically does not occur. Except in an emergency, its use should be limited to a hospital, and preferably to the operating room. Once the pins or wires have been aseptically and satisfactorily placed, the secret of avoiding infection and drainage is to leave the dressings strictly alone, and to carefully avoid all lateral movement of the pin. A general or spinal anesthetic simplifies the procedure. With the patient on the Hawley table, the leg is shaved and prepared as for any surgical procedure. Using a jointed Steinman pin and the handle provided, a pin is driven exactly through the center portion of the os calcis, avoiding the important structures posteriorly and below the malleoli. The pin should be placed straight and at right angles to the bone; this is the only difficult part of the procedure. Another pin is placed transversely through the upper crest of the tibia, just below the spine. This need not be deeply placed. Dressings soaked in tincture of merthiolate or mercurochrome are pulled over the pin ends to cover the puncture wounds closely. The traction bow is applied to the lower pin and attached to the traction foot plate. With the perineal counter-traction post in place, and the opposite foot fixed in its traction stirrup, slow screw traction is applied until the leg is taut and measurement shows the length of the two legs to be the same. It is wise to overcorrect the fragments a little as, when this is done, reduction is often spontaneous. Side-to-side compression of the fracture site will effect a reduction. An x-ray is now taken in two planes, and while waiting for this to be developed, the application of the cast can be started, leaving the fracture site exposed until the films are seen. If the fracture is over-corrected, traction is reduced a corresponding amount, so that bone-to-bone approximation is obtained. This is important, as non-union will often result if the over-correction is allowed to remain. The cast is now completed, incorporating both pins snugly. In all fractures except those low near the ankle, the cast should extend above the knee. A window is cut over the patella, and when the cast is hard, the traction is discontinued. A check-up x-ray is taken for record. The patient is put to bed with the foot elevated on pillows. The toes are watched closely for signs of circulatory disturbance. At the time the cast is applied, it is best to split it up one side, so that it may be easily loosened if necessary. After forty-eight hours, when it is established that there is no pressure or circulatory disturbance, the patient is allowed up on crutches. In four or five weeks, the pins are removed and a new cast applied with a walking iron incorporated. Weight bearing is then continuous until the cast is removed at the end of three months. If callus is satisfactory, no further support is necessary. If there is any question as to the stability of the fracture, it is best to have a caliper brace fitted.

There is no question that reduction is made more easy if traction is applied with the knee at right angles. For this purpose various frames have been devised, among them those of Boehler, Watson Jones, and Martin. Martin's apparatus is simple and can readily be made. I am advocating the Hawley or other fracture table, since it is found in nearly all hospitals, and because the technic is simple. The results are very good.

When fractures are seen unreduced after an interval of several days, there is some danger of damage to soft parts if a rapid reduction is done on the fracture table. In these cases it is often best to place a Steinman pin or a Kirschner wire through the os calcis, and apply traction on a Braun or Boehler frame. The foot of the bed is raised to provide counter-traction, and from 15 to 40 pounds of weight will be required to effect reduction. When the fracture is reduced, the amount of weight is cut down so as not to over-correct. After a month of traction, a cast can be applied. While the leg is on the frame, pressure sores are prone to develop under the knee and over the achilles tendon, and these must be guarded against by proper care and padding. To prevent anterior bowing at the fracture site, the calf must be allowed to sink to its normal contour. The traction apparatus must be readjusted several times daily if it is to be kept efficient.

Compound fractures in this region are common. They usually consist of puncture wounds by sharp fragment ends, but are sometimes extensive. By opening up the puncture, and irrigating the wound thoroughly with saline, and with an antiseptic such as tincture of merthiolate, primary closure and rapid healing is the rule. More extensive wounds require a thorough removal of foreign material and badly injured tissue. Irrigation to cleanse the wound will promote uneventful healing. Orr's method of packing the wound with vaseline gauze gives good results. In all compounded fractures the routine use of tetanus and gas bacillus antitoxin is advocated. Should gas bacillus infection develop, it is much less virulent if antitoxin has been given prophylactically.

With satisfactory skeletal traction, the need for open reduction is markedly reduced. There will be an occasional case, particularly of the spiral type of fracture, where interposition of soft tissue prevents reduction, which will have to be reduced openly.

Swelling and the formation of blisters do not contraindicate immediate reduction and the application of a cast. If the blisters are opened aseptically, and a protective dressing applied, they will heal readily under a cast. If the fracture is reduced early and a cast applied, they will usually not form. The best prophylaxis for the avoidance of all complications is immediate reduction of the fresh fracture.

INTRA-ARTICULAR FRACTURES OF THE ANKLE RESULTING FROM INDIRECT VIOLENCE*

VERNON L. HART, M.D., F.A.C.S.
Minneapolis

INTRA-ARTICULAR fractures of the ankle resulting from indirect violence are very common in active adult individuals but are uncommon injuries in children. They are major problems, since considerable disability may follow delayed and inadequate treatment. The object of this brief paper is to review certain anatomical, physiological and surgical principles upon which the therapy of this group of fractures is based.

The names of Pott, Dupuytren and Cotton are prominent in the history and description of fractures of the ankle. Their names are inseparably related to many of the various classifications of ankle joint injuries. Modern classifications are based on the mechanism of production of the fracture and the pathological anatomy resulting from the injury. The one by Ashhurst and Bromer[1] increased materially our understanding of the mechanics involved in the production of fractures about the ankle. Key and Conwell present an anatomical outline for the purpose of treatment in their recent text, Fractures, Dislocations, and Sprains.

The surgeon who attempts to treat ankle joint fractures must have a thorough understanding of the following two subjects: (1) the normal and pathological anatomy and physiology of the ankle joint mortise; (2) the functional treatment of fractures. The principles involved in the first subject have been emphasized by Skinner[4] and those included in the second subject are the well-known but too infrequently applied teachings of Böhler.[2]

The fork-like mortise of the ankle joint is formed by the articular end of the tibia, above; the internal malleolus, medially; and the external malleolus or distal end of the fibula, laterally. For the purpose of description of ankle fractures the anterior and posterior margins or lips of the mortise are referred to as the anterior and posterior malleoli, respectively. The mortise embraces and articulates with the body of the astragalus. The anchorage of the astralagus within the mortise is extremely secure by virtue of the strong medial and lateral ligamentous attachments. Normally, there is no lateral movement of the astragalus within the mortise. Flexion and extension are the normal movements of the ankle joint while lateral motions are functions of the subastragalar and calcaneo-cuboid articulations. The astragalus is an important and interesting bone. Its body is the keystone of the foot. No tendons are attached to it and it is the only tarsal bone which transmits the entire body weight. It is also the only tarsal bone which is in direct anatomical relationship with hind-foot, fore-foot and leg. It enters into the formation of the most important joints of the foot, the tibiotarsal or ankle joint and the subastragalar joint which includes the calcaneo-astragaloid and calcaneo-astragalo-scaphoid articulations. The body weight is directed in two directions from the astragalus, downward and backward through the hind-foot, and, downward and forward through the fore-foot.

A continuation of the mid-longitudinal axis of the shaft of the tibia normally bisects the body of the astragalus in both the antero-posterior and the lateral planes (Fig. 1). This anatomical fact is translated into a physiological or functional expression as "the normal weight bearing lines" which are disturbed by all intra-articular fractures of the ankle with displacement of the fragments. A lateral radiogram reveals that the contour of the articular surface of the body of the astragalus is convex while the antero-posterior view demonstrates a concave outline into which fits the convex articular surface of the tibia. A continuation of the mid-longitudinal axis of the shaft of the tibia normally passes through the apex of the convex surface of the tibia and through the center of the depth of the concave outline of the articular surface of the astragalus (Fig. 1). This anatomical and roentgenological relationship is lost in all ankle fractures with displacement but is restored with perfect functional reduction.

---

*Read before the Minnesota Orthopedic Society at the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

Every fracture of the ankle with displacement of either the internal or external malleolus is in fact a dislocation of the astragalus in relation to the mortise of the ankle joint. The malleolus which is fractured and displaced is in normal relation with the astragalus while the malleolus which is intact has been separated from the astragalus by a rupture of the corresponding lateral ligament. The fractured and displaced malleolus is firmly attached to the astragalus and the astragalus is in normal relation with the foot; therefore, the foot serves as a lever by which the position of the astragalus and fractured malleolus may be controlled and restored to the normal.

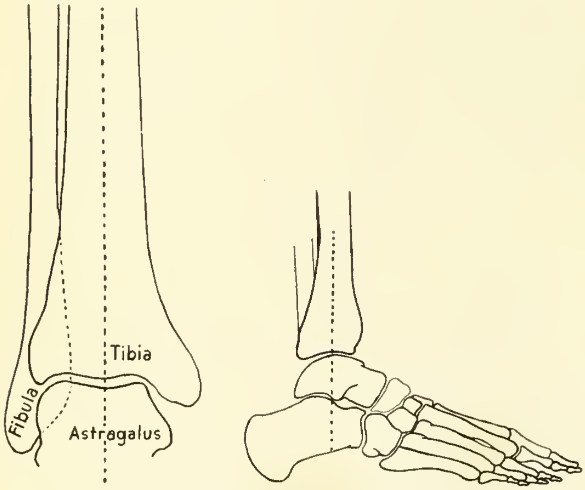


Fig. 1. A continuation of the mid-longitudinal axis of the shaft of the tibia normally bisects the body of the astragalus in both the antero-posterior and lateral planes.

A classification of ankle joint fractures with displacement, for the purpose of treatment, should emphasize the type of dislocation of the astragalus in relation to the mortise of the ankle joint, as well as the displacement of the foot in relation to the normal weight bearing lines or mid-longitudinal axis of the shaft of the tibia. The maneuvers of any manipulative reduction are attempts to reduce the dislocated astragalus and to reëstablish the weight bearing lines. If, following reduction, radiographic studies reveal that the mid-longitudinal axis of the shaft of the tibia does not bisect the body of the astragalus, then the manipulation has failed and should be repeated. The surgeon's attention should not be confined to the alignment of the fractured fragments. Although their position may appear satisfactory in the post-manipulative radiograms, manipulative reduction should be attempted again if the normal weight bearing lines have not been restored.

The dislocation of the body of the astragalus from the mortise of the ankle may be anterior, posterior, medial, lateral, upward or rotational. Various combinations of the above displacements may occur. Since the rationale of manipulative reduction is based upon the exact type of dislocation of the astragalus it is obvious then that the relation of the body of the astragalus to the mid-longitudinal axis of the shaft of the tibia in both antero-posterior and lateral planes must be accurately determined by proper radiographic studies before the reduction is performed.

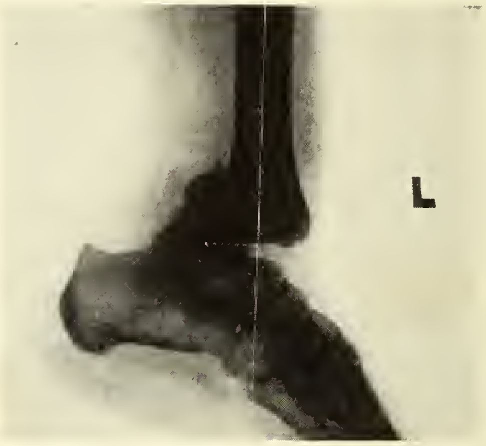


Fig. 2. Trimalleolar fracture (internal and external malleoli and posterior tibial margin) with posterior dislocation of the astragalus in relation to the ankle mortise.

The fracture may involve one or more of the four margins of the ankle joint mortise—the internal, external, posterior or anterior. Isolated malleolar, bimalleolar and trimalleolar fractures with displacement of the fragments should always be studied and treated as dislocations of the astragalus. The methods of reduction advocated by the writer are based on the principle of functional reduction of the dislocation of the astragalus and restoration of the normal weight bearing lines. Anatomical reduction of the malleolar fragments is not infrequently achieved with the functional reduction of the dislocation. However, if satisfactory functional reduction of the dislocation is not combined with anatomical reduction of the fragments it does not follow that open operation should be done in order to gain anatomical position of the fractured malleoli.

Intra-articular fractures of the ankle with malleolar displacement should be treated by manipulative reduction based on the principle of functional reduction and not necessarily on the principle of perfect anatomical reduction.

As a rule the injury is not complicated by shock. Reduction should be done immediately before hemorrhage, swelling and edema have developed. During transportation of the patient to the hospital the foot, ankle and leg should be well supported by an emergency splint such as a pillow splint, wire basket or Cabot posterior wire splint. Constricting bandages should be avoided. Antero-posterior and lateral radiograms are studied to determine the extent of the injuries to the mortise of the ankle and its content, the astragalus. The reduction is done with anesthesia, either local, spinal or general, according to the preference of the surgeon.

The maneuvers of any reduction entirely depend upon the type and extent of the astragalar dislocation. Trimalleolar fracture with posterior and lateral dislocation may present a difficult problem for reduction to many surgeons (Fig. 2). The following method is used by the writer (Fig. 3a, b, c).[10] The posterior displacement is corrected by manual traction with the fore-foot in one hand and the heel in the other while counter traction is provided by a padded muslin bandage which is fixed to the plaster or operating table and surrounds the lower third of the leg with the knee flexed (Fig. 3a). The lateral displacement is reduced by medial traction and inversion maneuvers while the longitudinal traction on the foot is continued by an assistant. The fractured malleoli should be squeezed into their normal positions so that they will firmly grasp the body of the astragalus.

The final position of the foot should not be in eversion or inversion but neutral as to lateral position and at a right angle in relation to the leg. Edema may be partially eliminated by digital pressure. Stockinette or one layer of sheet wadding is applied next to the skin. The heel and bony prominences are protected with felt. A light and well-molded plaster-of-Paris cast is applied, incorporating the foot, ankle and lower one-third of the leg. The longitudinal traction is continued until the cast has hardened (Fig. 3b).

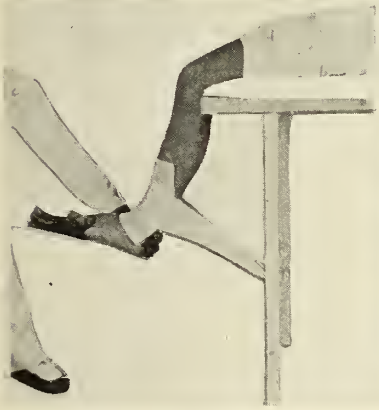


Fig. 3a.

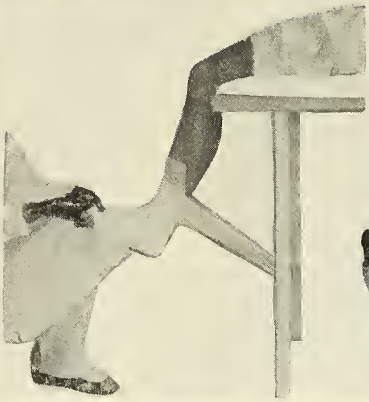


Fig. 3b.

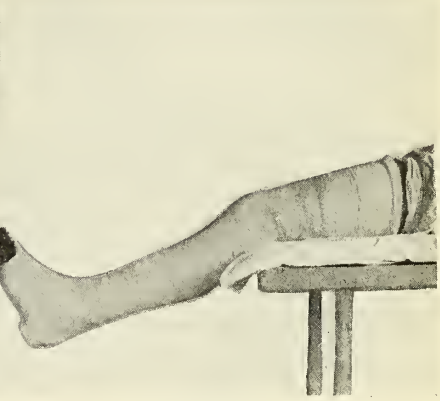


Fig. 3c.

Radiograms are now taken and studied. If the reduction is perfect then the counter traction bandage is released and the cast is continued to mid-thigh with the knee in slight flexion (Fig. 3c). A plaster heel consisting of a firm roll of sheet wadding covered by several layers of plaster is applied to the cast instead of an iron stirrup. The plaster heel should be level and flat and in direct line with the leg (Fig. 3c). It should be of a thickness which will just remove the fore-foot from contact with the floor when the patient becomes ambulatory. It is rarely necessary to bivalve or cut the cast longitudinally because of circulatory complications if the extremity is properly and immediately elevated with the foot higher than the knee and the knee above the heart level. The cast should not be covered with bed clothing until it has thoroughly dried. The patient is instructed to contract actively and frequently the flexor and extensor muscles controlling the toes since muscular contractions favorably influence the circulatory system. Heat applied to the ankle by means of hot water bottles, electric pads or electric bulbs may aid in the control of pain.

After a period of about one week, when the inflammatory reaction from the injury has subsided, the patient becomes ambulatory with crutches and with partial weight bearing directly on the injured extremity. The portion of the cast above the knee is now removed. If the cast enclosing the foot and ankle is loose because of considerable edema, originally, then a new one is applied. At this point in the procedure many surgeons meet with difficulties because the patient complains of pain and swelling of the foot when weight bearing.[11] If the surgeon gives the patient the following program and if it is followed religiously then the patient and surgeon will both be relieved of the distressing problems of pain and swelling.

PROGRAM FOR PATIENT TO BECOME AMBULATORY

Day	Elevation Minutes each Hour	Weight Bearing Minutes each hour
1st	59	1
2nd	58	2
3rd	57	3
4th	56	4
5th	55	5
6th	50	10
7th	40	20
8th	30	30
9th	20	40

Following the tenth day the patient may be ambulatory much of the time with several half-hour or one-hour periods of elevation. The patient should now be contracting the muscles which control the ankle joint in order to maintain muscle tone and to aid circulation. After several weeks the patient may walk with one crutch and then gradually change to the use of a cane. After a period of about two months the cast is removed. The degree of painless and active motions that are possible in the ankle joint are usually very surprising and encouraging. The ankle may be strapped with adhesive or a short single or double upright brace may be applied in order to protect the ankle from subsequent strain or injury. Hot foot and leg baths or contrast baths several times daily with active muscular contractions and joint motions in all directions are valuable in aiding the complete restoration of the neuro-vascular-muscular and articular mechanisms.

Partial permanent disability, post-traumatic circulatory edema, deformity, and traumatic arthritis of the ankle joint will infrequently complicate the therapeutic program for the treatment of intra-articular fractures of the ankle if the principles of "Functional Reduction" as emphasized by Skinner and the principles of "Functional Treatment" as expressed by Böhler are applied by the medical profession.

References

1. Ashhurst, A. P. C., and Bromer, R. S.: Classification and mechanism of fractures of the leg and bones involving the ankle. Arch. Surg., 4:51-129, 1922.
2. Böhler, Lorenz (Translated by M. E. Steinberg): Treatment of fractures. Wilhelm Maudrich, Vienna, 1929.
3. Henderson, Melvin S.: Fractures of the ankle. Wisconsin Med. Jour., Oct., 1932, 31:684-691, (Oct.) 1932.
4. Skinner, E. H.: The mathematical calculation of prognosis in fractures at the ankle and wrist. Surg., Gyn. and Obst., 18:238-242, 1914; Tr. Internat. Cong. Med. Lond., 1913; Jour. Am. Med. Assn., March, 92:693-694, 1929.

THE BROKEN NOSE*

Some Simple Rules for the Management of Recent Fractures of the Nasal Bones in General Practice

VIRGIL J. SCHWARTZ, M.D.
Minneapolis

WE all see many instances of nasal deformity which frequently engender not only social problems, but economic problems as well, not to mention the physical disturbances due to the intranasal abnormalities which so often follow nasal fractures. Most of these cases could be relieved or cured by intelligent manipulation immediately after the trauma. Unfortunately, many of them are neglected, particularly in early childhood, and especially in remote communities where the services of a rhinologist are not obtainable.

In such communities, if the man who sees these cases first, that is, the general practitioner, were properly trained, some of the simple cases could be taken care of by him at once.

Most recent nasal fractures fall into one of two groups, namely, the median type, in which the blow was struck more or less in the midline, that is, from directly in front, and the lateral type, in which the blow was struck from one side or the other.

In the median type, the nasal bones are fractured and depressed approximately equally. Frequently the fracture flattens the nasal bridge and at the same time breaks laterally the adjacent portion of the maxillary bones. In these cases we feel a very definite ridge at each side of the nose. In other cases the lower ends of both nasal bones are broken and displaced posteriorly without involvement of the upper part of the bridge.

In the lateral type, we find a depression of the nasal bone and possibly of the adjacent part of the maxillary bone on the side where the blow was struck, whereas the opposite bone will be displaced toward the other side. In these cases it is obvious folly to attempt to push inward the opposite bone until the depressed bone or bones are first elevated and correctly replaced.

The nasal bones are two quadrilateral—not triangular—bones at the bridge of the nose. These articulate above with the frontal bone, medially with each other, laterally with the nasal processes of the maxillæ and below with the upper lateral cartilage. Preston states appropriately that the bones meet in the median line and rest upon the spine of the frontal somewhat as the rafters of a roof rest upon the king-beam. The nasal spine itself is supported posteriorly by the vertical plate of the ethmoid and this continuity of bone from the bridge to the crista galli explains why a blow on the nose can force the perpendicular or the cribriform plate of the ethmoid up into the anterior cranial fossa. This becomes more true with increasing age since the articulations become so firmly ossified as to constitute one solid mass of bone, transmitting, at times, the force of a blow from one end to the other. Below the upper lateral cartilage is the lower, on each side, as well as a number of small sesamoid cartilages, all bound together by connective tissue and subject to movement by the muscles which contract or dilate the nasal introitus.

The septum is formed principally by the cartilage, the vertical plate of the ethmoid and the vomer. The crests of the maxilla, palate and nasal bones and the nasal spines of the frontal and maxilla also enter a little into the formation of the septum, but for present purposes these may be disregarded. It must not be thought that nasal trauma is always the cause of septal deviations. These are found very often in patients who have no history of any injury whatsoever, and are explained by improper development of the facial and nasal bones. For instance a child with a high, peaked palatal arch due to the presence of adenoids or to some other cause has a condition in which the nasal floor is crowded up against the nasal ceiling, bending or dislocating some parts of the septum in the process. Such deformities are very common, and, in fact, are often of no clinical importance, but an injury to the nose may cause marked exaggeration of such a mild deformity.

---

*Presented before the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

Almost all fractures of the nasal bones are compound, that is, they are open through the skin or the mucous membrane or both. Usually the septal cartilage is involved more or less.

In a lateral fracture the depressed bone is often driven posteriorly beneath the nasal process of the frontal bone, and is there impacted. It may also have been pushed beneath the nasal process of the maxilla. The opposite nasal bone is also separated from its attachments, but usually it *overlies* the adjacent bony structures. Very frequently a considerable portion of the nasal process of the maxilla is broken off, along with the nasal bone, being depressed on the primary side and pushed outward on the opposite side. In lateral fractures of considerable degree, the depressed nasal bone acts as a splint against the opposite one, holding the latter out somewhat as the back prop of an easel holds the frame forward. Many ill-advised, even vicious, efforts have been made to force the protruding nasal bone medially without first lifting the depressed bone laterally and anteriorly. Such efforts not only produce no improvement, but result in further trauma. Of the coexisting fractures in adjacent bones, the most dangerous is that in the cribriform plate of the ethmoids.

General Management of All Types of Recent Nasal Fractures

1. *History of injury:*
    a. When and where.
    b. What was the nature and force of the traumatizing object—a blunt or sharp object, a fall, a swinging door, etc. From this we may form some opinion as to the depth of the wound and extent of injury, including the possibility of a coexisting basal skull fracture, or of intracranial complications.
    c. Ascertain whether or not the patient's nose was perfectly straight before the injury. He may be a malingerer who is trying to build up a lawsuit. Try to get a recent photograph of the patient, prior to the injury; the deformity may have been incurred, in part or in whole, many years ago. In fact, the patient may honestly be unaware of a pre-existing deformity, the matter being brought to his attention by the present injury. Some persons, especially athletes, suffer repeated nasal fractures. I have just seen a boy whose nose has been broken three times, once at football, a second time at basketball and the third time at boxing. This patient volunteered the information that the second and third fractures did not appreciably alter his appearance. From a medicolegal standpoint, therefore, it is well to establish the presence or absence of nasal deformity and obstruction, and even the condition of the sense of smell, prior to the injury.
2. *Symptoms:*
    a. Pain—usually not marked.
    b. Nasal obstruction—which side and how much; usually it is marked.
    c. Evidences of cerebral involvement, due to concussion, skull fracture, hemorrhage, or the driving of bones upward and backward into the anterior cranial fossa, leading to brain abscess or meningitis.
    d. Lacrymation, when the nasolacrymal duct is involved by a fracture of the maxilla.
3. *Physical Signs:*
    a. Swelling of the nasal and adjoining tissues, external and internal.
    b. Contusions, abrasions and lacerations—superficial or deep.
    c. Ecchymosis or other discoloration of the skin or conjunctiva.
    d. Large bullæ and vesicles in the traumatized area. These are common in or near any fracture zone, and are transitory, though they may resemble pemphigus.
    e. Lacerations of the nasal mucous membrane, with hemorrhage. This makes the case a compound fracture, but it is astonishing to find how rarely bony infection develops through these channels. Hemorrhage from within the nose is usually prima facie evidence that there has been a separation or fracture severe enough to cut the nasal mucosa.
    f. Tenderness on even gentle pressure is often marked.
    g. Emphysema: Some of the text-books give the impression that this symptom is definite evidence of involvement of one of the nasal sinuses in the fracture. This is not so, since blowing the nose may force air beneath the skin through a tear in the mucosa. However, the sinuses,

both frontal and maxillary are often involved if the corresponding bones are fractured.

h. Crepitation—grating or clicking of the bony fragments upon pressure—is often felt. Its absence by no means signifies that a break is not present.

i. Excessive mobility of the nasal bridge.

j. External deformity depends upon whether the case is a lateral or a median fracture. When the blow was struck from the right or the left, there is a sinking in of the nasal bridge on the primary side and a pushing out on the opposite side. The nasal bridge or the entire nose is bent toward the opposite side. The nasal contour may be gently bowed or sharply angulated. In a median fracture, if the blow was not very severe, only the lower ends of both nasal bones will be found to have been fractured, tranversely. If such a fracture was due to a more severe blow, the nasal bones are broken, transversely, higher up, at or near their articulation with the frontal bone. They are flattened down also, since the center of the nasal bridge is driven posteriorly, forcing the lateral edges outward. This also makes the bridge much wider. Very often the fracture does not take place at the suture line at all, but in the nasal process of the maxillary or frontal bones, since the articulations here are very firm. As a result, a sharp ridge is felt at one or both sides of the nasal bridge. When the upper lateral cartilages are torn away from the nasal bones, the ala nasi are markedly depressed, flattened and widened.

k. Intranasal deformity includes:
   I. Deviation or dislocation of the septum.
   II. Hematoma, usually of the septum.
   III. Obstruction of the air space on one or both sides.

Septal deformities are very common, and may be gently bowing, or sharply angulated deformities (which later develop so-called "spurs") toward one side, the concave side being deeply grooved. This deformity may be most marked at the anterior end of the septum (in the cartilage), or at the junction of the cartilage with the maxilla near the nasal floor, or at the articulation of the cartilage with the ethmoid or most commonly at its junction with the vomer.

4. *Diagnosis:* From the history, symptoms and signs it should be very easy to make a diagnosis. X-ray plates are often, but not always, essential.

5. *Complications:* Most of these have already been mentioned. Intracranial complications are frequent and dangerous. Fracture into a sinus may lead to inflammation here, but it rarely does. Local infection in the nose is not uncommon. Softening or necrosis of bone or cartilage may develop following hematoma or suppuration, with contraction of the affected tissues and secondary deformity. Osteomyelitis, chondritis, erysipelas, cellulitis, periostitis or perichondritis may be late complications. A patient with a hematoma over a cartilaginous area should always be warned that the cartilage may soften, shrink and be twisted into an unnatural shape eventually even despite drainage.

6. *Prognosis:* The outlook so far as life is concerned, is very good unless there is a deeper fracture of the skull. From the standpoint of the deformity, in promptly and properly treated uncomplicated cases, the prognosis is good. When the trauma is severe and the comminution marked, it may not be possible to replace or hold in position all the small bony fragments, and for this reason the prognosis should be guarded in such cases.

7. *Treatment:* The method of reducing a simple fracture of the nasal and adjoining bones is one of the most universally accepted, time-tried and efficient procedures in surgery.

If the history warrants it, as in the case of an automobile injury or trauma sustained in a farm yard, the advisability of administering tetanus antitoxin must be kept in mind always.

a. Anesthesia: Occasionally local anesthesia may suffice. If so, cocain in 10 or 20 per cent solution, or even in powder form, must be applied to the anterior ethmoidal nerve, on the posterior surface of the nasal bridge. In the great majority of cases, however, the best results will be secured on using general anesthesia,—nitrous oxide, ethylene or ether. If local is used, the patient always feels some part of the manipulation and the surgeon may hesitate to use the requisite amount of force in completing the reduction.

b. Place a cotton applicator saturated with epinephrin high up behind the nasal bridge, before beginning the reduction. There is usually considerable bleeding even so; therefore it is well to have some sort of suction in the pharynx during the manipulation.

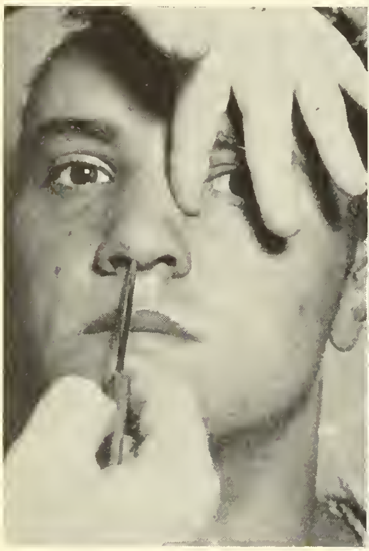


Fig. 1. The elevator raises the depressed right nasal bone into position, while the left is pressed medially.

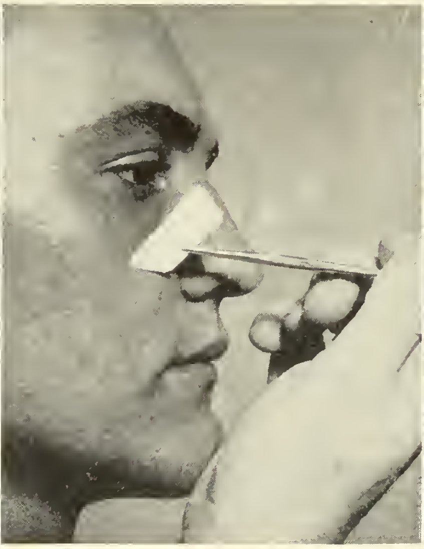


Fig. 2. The manner of measuring and trimming the tampon. This view also indicates the position of the tampon after insertion.

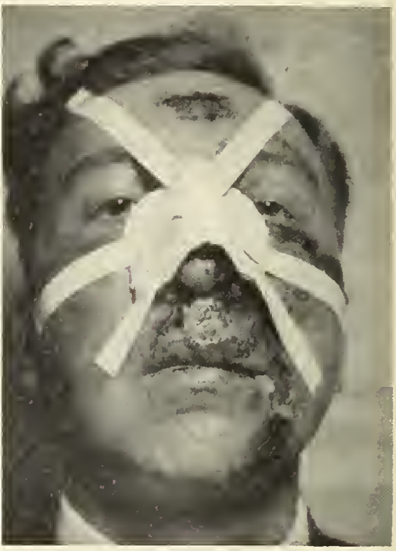


Fig. 3. The shield applied. It does not press on the nasal bones.

c. We next proceed to thorough cleansing of the skin with soap and water, and the removal of all dirt, foreign bodies, and loose fragments of bone. Alcohol, iodine, mercurochrome (aqueous) or any other satisfactory germicide must be used.

d. Remove all necrotic tissue which is destroyed beyond redemption.

e. Repair the skin wounds by reapposition and suture.

f. Elevation of depressed fragments is the one most important procedure in this entire consideration. In a median fracture, the broken portions of nasal bone must be raised anteriorly and replaced, not flat, but in their normal arched position. If after this has been done a vertical ridge is still present at each side of the nose, it is due to a fracture outward of the nasal process of the maxilla. With the nasal bones raised into place, the maxillary fragments can usually be pushed medially into proper position.

The elevation is done with any smooth, flat, narrow, thin but strong instrument. Sometimes even the narrow handle of a scalpel will do, but a nasal elevator is, of course, better. The instrument must be of this shape because it must be inserted as high as necessary (being mindful not to injure the cribiform plate of the ethmoid) in the narrow space along the posterior surface of the nasal bones, between these and the septum.

If the lateral cartilages have been torn loose from the lower margins of the nasal bones or the maxillæ, they too must be replaced. If there is a fresh deformity of the septum, this will be much improved by relieving the pressure on it through lifting the depressed bridge anteriorly. If some septal deformity remains and cannot be corrected by gentle manipulation, it will probably have to be corrected later through a submucous resection by a competent rhinologist.

Fresh median fractures, in my hands, usually require no internal splints, especially if the nasal processes of the maxillæ are fractured, since these might be pushed out again. Occasionally an internal splint is advisable, to hold the nasal bones forward and to help keep the septum straight. Many things have been used for this purpose. I favor the compressed cotton tampons of Simpson or Good, because they are easy to insert and swell enough upon absorbing moisture to hold their position. I do not like the ordinary method of simply inserting these splints up behind and parallel to the posterior surface of the nasal bones, for the tampon will slide downward and posteriorly, doing more harm than good. The tampon must stand perpendicular to the posterior surface of the nasal bridge. Each end of the splint is trimmed with scissors so that after insertion the anterior end may be drawn firmly high and anteriorly into the angle between the septum and the nasal bone, while the lower end is propped against the floor of the nose, anterior to the inferior turbinate or between the inferior turbinate and the septum. Upon swelling, this usually holds its position and is therefore effective immediately behind the nasal bone, where we want it to be. It may be allowed to remain a day or two, after which it is removed or replaced. When covered with petrolatum the splint is easier to remove, and there is less trauma, but it holds its position a little better without the ointment.

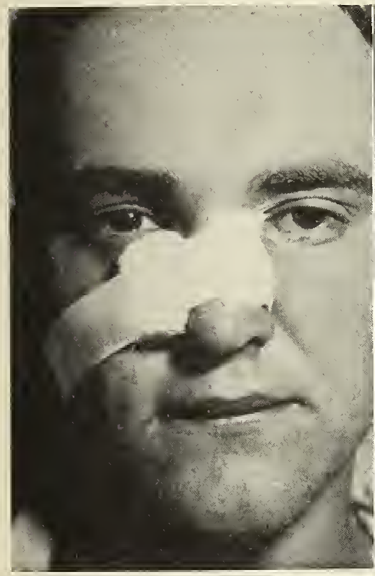


Fig. 4. Traction following replacement of the nasal bones toward the previously depressed side. The fracture was nine days old.

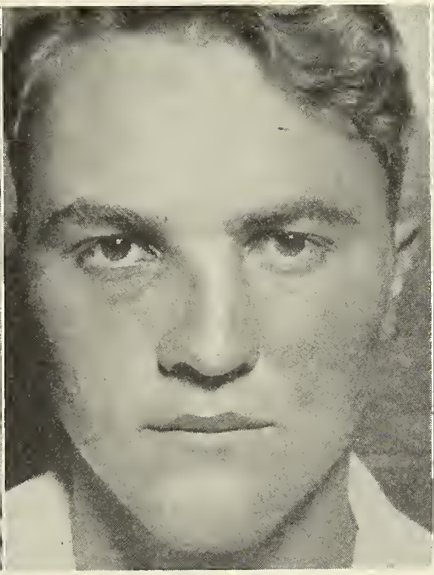


Fig. 5. A typical lateral fracture.

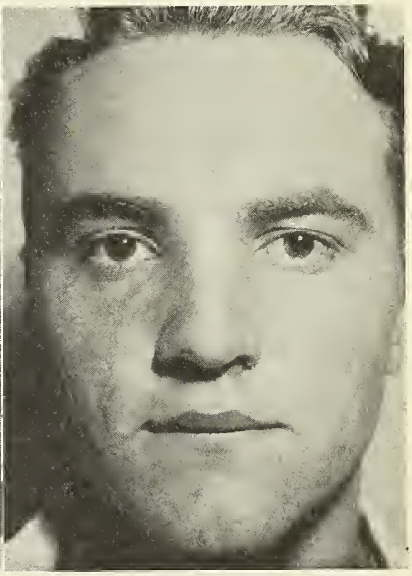


Fig. 6. Patient shown in Figure 5, one week later.

As for external splints, a great number and variety have been used for counterpressure on a projecting or recurring deformity. I prefer in such cases to repeat the operation and reset the bones.

I always apply a metal protector over the nose, but without making contact with the nasal bridge. For this purpose we use a piece of sheet aluminum of about 24 or 28 gauge, 1 to 2 inches wide and 3 to 5 inches long, depending on the age of the patient and the size of the nose. The corners are cut off, the sharp edges turned back and the plate bent in the middle so as to form a protection over the nose resting on the cheeks at each side of the nasal bridge and clearing the bridge freely. This plate is then covered with adhesive tape and lined with a thin sterile dressing. The whole is then applied over the operated nose and is held in place with adhesive strips from cheek to cheek and from forehead to cheek. This prevents motion horizontally as well as vertically.

The importance of this metal splint lies in the fact that very frequently a nose may be excellently reformed only to be again distorted within twenty-four hours by rolling on the face during sleep, violently blowing the nose (which at these times is usually congested) and by other careless maneuvers. If deformity recurs, the reduction must be repeated. The skin dressings are changed daily, and the protecting shield is cleaned; usually it must be stripped and covered with new adhesive, the original being bloodstained. Although I am not as a rule a proponent of proprietary medications, I always use 2 per cent aqueous mercurochrome in dressing the skin because it does not injure the eyes and because it seems to have an unusually favorable effect in preventing and treating infections of the skin immediately overlying these fractures. This procedure is repeated daily, and usually in from ten days to two weeks the protector is discarded. Fair union begins to develop in about a week, while firm union may be expected in three to four weeks. The older the deformity after the first four or five days, the harder it is to correct, and the greater the force necessary to separate the fibro-osseous union. The skin dressings are continued as required. Silver nitrate may be used where necessary, being careful that it does not enter the eyes. Some excellent operators use splints made of thin sheet copper which fit snugly over the nasal bridge, resting on the cheeks at each side. It seems to me that, unless the copper is sufficiently firm, there is some chance that the bony arch may be inadvertently depressed, so I prefer a protector which does not touch the nasal bridge. Incidentally, this protector may be cut so as to leave attached to the center of its upper margin a narrow strip of metal which then widens out into a larger plate on the forehead. The latter is firmly fixed in place with adhesive tape.

Occasionally there may be indication for using an Adams forceps. One flat blade enters each nostril and when parallel they are about one-eighth to three-sixteenths inch apart, approximately the thickness of the septum. This is used to raise the nasal bridge and septum into proper position. I rarely find this instrument necessary.

Fresh lateral fractures present a different situation from that found in the median type. The depressed bone stands behind the opposite one, causing the latter to project.

The depressed fragment is raised anteriorly and laterally. This of itself tends to draw the opposite bone medially and often into position. Usually, however, it is necessary to press the projecting bone medially with the thumb or forefinger of the left hand, while elevating the depressed bone with the instrument held in the right hand, or vice versa. When the replacement has been completed, the nasal bridge should be straight and properly arched. It is well to insert a Good tampon as above described in the side which was previously depressed, to help hold this nasal bone laterally. No tampon should be placed in the opposite side. Then the aluminum cover is applied. If the fracture is several days old, there may be a tendency for the fragments to go back into a slight malposition. In order to overcome this, the whole nasal bridge is drawn as firmly as possible with adhesive tape over a small roll of gauze, toward the previously depressed side, into a position of overcorrection. The diameter of the roll of gauze must be a little greater than the height of the nasal bridge, because we do not want to depress the loose bridge while drawing it forcefully to one side.

This overcorrection is not molested for two or three days, when it will be found that there is, in fact, not overcorrection, but rather a straight nose. If the adhesive meanwhile has slipped, it may be reinforced with another strip directly over it. Adhesive plaster sticks to adhesive plaster better than it does to skin. After about ten days, in most cases this plaster may be removed.

In concluding, I wish to repeat my conviction that the well known, simple principles and procedures outlined above can be utilized by many men in the general practice of medicine to correct recent, simple fractures of the nasal bones if the case is not complicated, and if the services of a capable rhinologist are not available.

DISTURBANCE IN FUNCTION OF THE PARATHYROID GLANDS OF CHILDREN*

ROGER L. J. KENNEDY, M.D.
Rochester, Minnesota

IN order fully to appreciate the changes that result from a disturbance in function of any of the glands of internal secretion, a knowledge of the part played by the gland in helping to maintain normal physiologic conditions in the body is desirable. In respect to the parathyroid glands, knowledge of their function is of fairly recent origin.

Gley, in 1891, removed the parathyroid glands of animals and demonstrated that this removal was followed, usually within two or three days, by a set of symptoms characteristic of tetany. Vassale and Generali, in 1900, offered the hypothesis that the symptoms were due to toxins, the effects of which were inhibited in the intact animal by the action of the parathyroid glands. Koch, in 1912, and 1913, found methylguanidine in the urine following parathyroidectomy. From these observations the view developed that the function of the parathyroid glands is the control or detoxification of guanidine in the body. This view generally is considered untenable.

McCallum and Voegtlin, in 1909, demonstrated that, during tetany in parathyroidectomized animals, there is marked reduction in the calcium content of the tissues, especially of the blood and brain, together with an increased output of calcium in the urine and feces, and an increased output of nitrogen and ammonia in the urine. They also found that calcium is of value in the treatment of spontaneous and postoperative tetany in man. Their view, that the function of the parathyroid glands is to control calcium metabolism, has been largely substantiated by subsequent experimental and clinical observations.

Erdheim noted cataractous changes in the lens of the eye in parathyroprivic tetany, and demonstrated that the teeth of rats deprived of their parathyroid glands become opaque, brittle and distorted, and that the bones are, to some extent, decalcified. Experimental parathyroprivic tetany may be improved or controlled by a variety of measures, such as by injection or feeding of calcium salts, production of acidosis by various means, bleeding and injection of saline solution, and by administration of the parathyroid hormone.

The picture resulting from the presence of an excess of the parathyroid hormone is quite the opposite. In animals it results in the following: a rise of calcium to as high as 20 mg. per 100 c.c. of serum; a fall of the serum calcium after thirty-six hours; increased excretion of calcium, phosphorous, and nitrogen in the urine; increased excretion of calcium in the feces; a decreased ratio of nitrogen to phosphorus in the urine; increase of nonprotein nitrogen, urea and plasma inorganic phosphates after twenty-four hours, presumably due to failing renal function; a marked increase in viscosity of blood, decrease in blood volume, increase in blood chlorides, and in the osmotic pressure of the blood; a decrease in electrical excitability, and anorexia, diarrhea, emesis, lassitude, muscular atony, coma, and death. Prolonged injections of smaller doses produce characteristic bony changes in addition to disturbances of metabolism.

Thus, experimental hypoparathyroidism and hyperparathyroidism indicate beyond peradventure that the function of the parathyroid glands is concerned with regulation of calcium metabolism and with maintenance of a constant level of calcium in the blood (tissues).

Clinically, cases are encountered which present features that correspond in all respects to those of experimental hypoparathyroidism and hyperparathyroidism. Among children, hypoparathyroidism is exemplified by the syndrome known as tetany. This may be of the type which occurs, although rarely, after removal of the thyroid gland, when the parathyroid glands may unintentionally be injured, or removed, or it may be of the spontaneous type which occurs among infants and older children. The type of tetany most frequently encountered in the practice of the pediatrician is the infantile type which is associated with low serum calcium rickets. The relationship of this type to parathyroid insufficiency is not clear. It can be effectively and permanently cured by administration of calcium and cod-liver oil. Evidence supports the view that a disturbance of the parathyroid bodies takes place and that this disturbance may be secondary to Vitamin D deficiency. The reciprocal relationship of secretion of the parathyroid bodies and Vitamin D recently has been the subject of considerable study by Wilder, Sheard and Higgins. Its discussion is purposely omitted here. In the postoperative type the causal relationship with parathyroid insufficiency is well established. In the spontaneous type, incrimination of the parathyroid glands is based on the similarity of the condition to postoperative tetany of known etiology. It is to be remembered that, if parathyroid insufficiency is of long standing, not only symptoms of tetany, but trophic changes, notably in the eyes, teeth, hair and bones, may also develop.

---

*From the Section on Pediatrics, The Mayo Clinic, Rochester, Minnesota. Read before the Northwest Pediatric Society at the meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

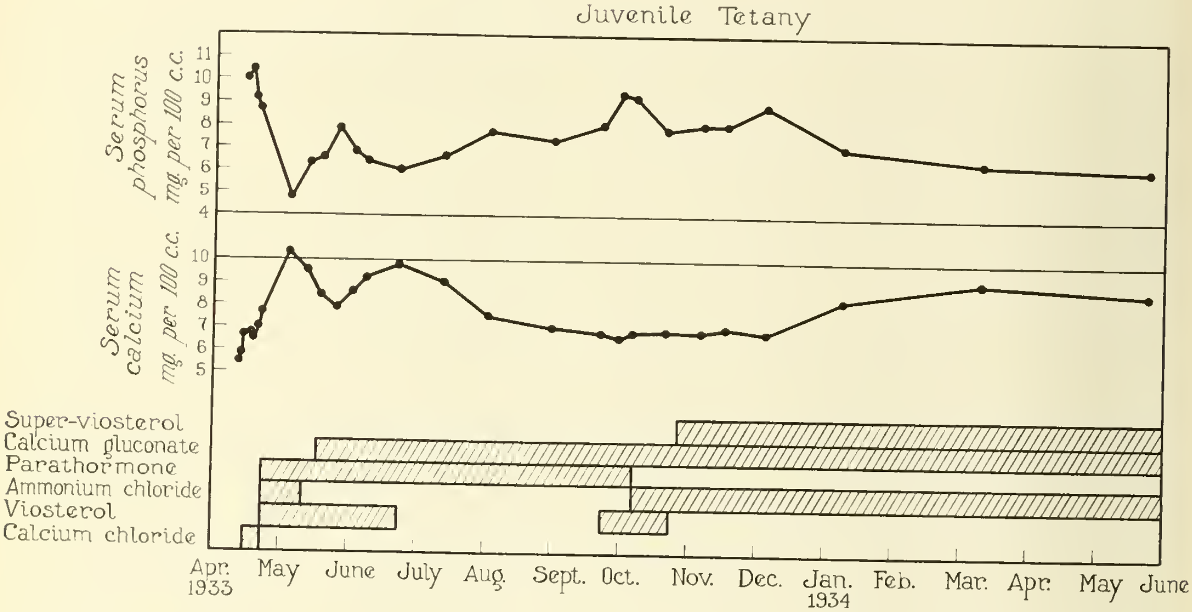


Fig. 1. Influence of various therapeutic agents on values for serum calcium and serum phosphorus in a case of juvenile tetany.

On account of the rarity of the condition, I wish to present the case of an older child with spontaneous tetany and to point out the probable rôle of parathyroid insufficiency in its etiology (Fig. 1).

Case 1.—A girl, aged ten years, was admitted to The Mayo Clinic in April, 1933. The complaint was of staring attacks during the preceding two weeks. Her father and mother, and one younger child were living and well. Birth and development had been normal, and the health of the child in the past had been good. She was in the fifth grade of school and was doing good work. She had had acute, suppurative, cervical adenitis in November, 1931, the node had been incised and had healed promptly. Two years before admission, following a gastro-intestinal upset, she had begun to have attacks characterized by flexion of the fingers and, sometimes, of the toes. These had been aggravated by febrile illnesses, intensive study, and by fatigue. The frequency of the attacks had varied from several a day, with residual stiffness which remained all day, to none at all for intervals which had been as long as two months. In the winter preceding admission, the condition had become more marked, so that during the last two weeks she had had about twelve attacks a day, each attack lasting a few seconds. Following the attacks, she had apparently been all right. Loss of consciousness had not occurred. Administration of phenobarbital (luminal) had resulted in vomiting, so it had been discontinued.

On physical examination the child appeared well-developed; she was about 14 per cent overweight. General examination gave entirely negative results, except for the fact that there was considerable grimacing and twitching of the muscles of the face and spontaneous carpal spasms. Chvostek's and Trousseau's signs were extremely marked. The electrical reactions were tested, and the excitability of the nerves was found to be so great that the cathodal opening contraction could not be obtained because of the tetanic reaction following the cathodal closing. The blood calcium levels were 5.5 mg. and 5.8 mg. per 100 c.c. Calcium chloride was administered in doses of 15 grains (1 gm.) three times daily. On the second day after admission, the serum calcium was 6.6 mg. and the serum phosphorus 10 mg.

per 100 c.c. The administration of calcium chloride did not materially alter the symptoms or the serum calcium and serum phosphorus levels. Parathyroid extract, viosterol, and ammonium chloride were then given with very rapid return to normal of the serum calcium and serum phosphorus levels, and the complete disappearance of symptoms. However, after the administration of parathyroid extract for two weeks the serum calcium values became progressively lower and the serum phosphorus values progressively higher; the symptoms returned and, probably because of immunity to parathormone resulting from use of the increased amounts of parathyroid extract, the values were practically the same as those at the time administration of the extract was begun. The patient's symptoms had returned with all their original intensity. Five months after beginning the use of parathyroid extract, it was discontinued, and she was given 15 grains (1 gm.) of ammonium chloride and 6 grains (0.4 gm.) of calcium gluconate; she also was given Mead, Johnson and Company's special viosterol in the dose of 1 drop daily (1 drop contains 10,000 units). Three weeks later this latter was increased to 2 drops, and in two months to 3 drops daily. During this time the serum calcium values increased and serum phosphorus values decreased and, in May, 1934, the serum calcium level was within normal limits, the serum phosphorus level was still somewhat elevated, and the clinical condition of the patient was satisfactory in every way. Trousseau's sign could not be elicited, nor could Chvostek's. The patient is to continue about the same course of medication for an indefinite period.

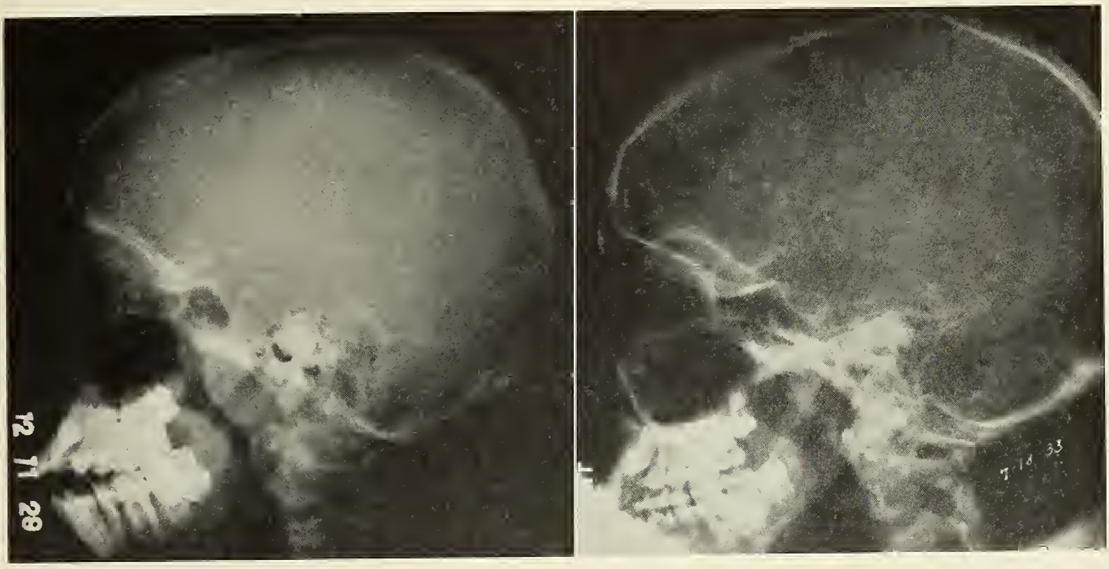


Fig. 2. Hyperparathyroidism. Roentgenograms of skull for comparison. *(Left)* Before operation, at the time of the report by Pemberton and Geddie, showing diffuse granular osteoporosis. *(Right)* Three years after operation, showing normal appearance of skull.

This case is considered one of parathyroid insufficiency because of the following features; positive Chvostek, Trousseau, and Erb signs, spontaneous carpal spasm, and increased general excitability of the central nervous system, together with marked reduction in the serum calcium level and marked increase in the serum phosphorus level. It demonstrates two very important points regarding treatment: (1) the futility of attempting to control the condition by means of parathyroid extract, and (2) the necessity for, and effectiveness of a Vitamin D preparation combined with generous doses of calcium.

Reports of cases of hyperparathyroidism have been appearing in ever increasing numbers. Mandl is credited with being the first to remove a parathyroid tumor in a case of generalized osteitis fibrosa cystica. Pemberton and Geddie, in 1930, gave the first report of a case of hyperparathyroidism in which the patient was a child; since then, other cases of the disease among children have been reported.

The picture in hyperparathyroidism is variable, depending on the severity and duration of the hyperfunction. It is accompanied by a disturbance in calcium and phosphorus metabolism, usually with serum calcium values as high as 20 mg. and with serum phosphorus values as low as 2 mg. per 100 c.c. There is increased excretion of calcium and phosphorus and a negative calcium balance, which may amount to 0.5 or more each day.

The manifestations of hyperparathyroidism are most evident in the osseous system, but the body as a whole is affected. Painful extremities, weakness, fatigue, nervousness, tachycardia, constipation or diarrhea, and renal colic may be present. The roentgenogram may reveal the decalcification that is typical of the disease, which may appear as diffuse osteoporosis or which may have progressed to formation of multiple bone cysts. Deformities of the bones frequently follow decalcification. Following removal of a parathyroid tumor, the condition improves rapidly and skeletal changes return to normal. Deformities, of course, persist.

I wish to refer, briefly, to the case reported by Pemberton and Geddie. The patient, a girl aged fourteen years, registered at The Mayo Clinic, November 3, 1929. She complained of attacks of vomiting, pallor, and loss of weight. In the year and a half prior to admission she had lost 31 pounds (14.1 kg.). The vomiting attacks had occurred at intervals of about two weeks or less and had lasted from one to five days. She had had polydipsia, and polyuria and nocturia. She was 40 per cent underweight, pale, and emaciated, and appeared to be chronically ill.

Electrical irritability was decreased, and excretion of phenolsulphonphthalein was 40 per cent and 45 per cent in two hours. The values for urea were 80 mg., 37 mg., and 40 mg. per 100 c.c. of blood. The normal value is from 25 to 40 mg. per 100 c.c. of blood. The serum calcium values were 16.32 mg., 17.67 mg., and 15.50 mg. per 100 c.c. before operation. The normal value is from 9 to 11 mg. per 100 c.c. The serum phosphorus values were 2.46 mg., 2.80 mg., and 3.20 mg. per 100 c.c. The normal value is from 3 to 5 mg. per 100 c.c. Immediately after operation the serum calcium values ranged from 7.56 to 7.89 mg. per 100 c.c. and the serum phosphorus values from 2.2 to 4.04 mg. per 100 c.c. The roentgenogram revealed diffuse decalcification of all bones, the water concentration test showed fixation of the specific gravity, and there was a slightly positive phosphorus balance and a slightly negative calcium balance before operation.

A parathyroid adenoma, measuring 1.5 by 1.25 by 1.25 cm., was removed November 16, 1929. Immediately following operation, the patient complained of tingling and numbness in the fingers and toes, and Chvostek's sign was present. Three days after operation, calcium chloride was given intravenously, with relief even before injection was completed. The same day, 10 units of parathyroid extract (Collip) were given subcutaneously. Cod liver oil, viosterol, and calcium chloride were administered daily following operation. The metabolic study after operation revealed a positive calcium balance; electrical excitability of the nerves approached normal. A roentgenogram of the skull made three years after operation gave evidence of a normal condition of the bone (Fig. 2).

This case is of interest because it illustrates the chief clinical, metabolic, and pathologic features of hyperparathyroidism in a child, namely, weakness, abdominal pain and vomiting, anemia, polydipsia, and polyuria, hypercalcemia and hypophosphatemia, decalcification of the bones, and the demonstration of a parathyroid adenoma, the removal of which was followed by immediate improvement and by ultimate recovery. These features satisfy all the requirements for the diagnosis of hyperparathyroidism.

Summary

Recent developments have disclosed facts which have clarified knowledge of the function of the parathyroid glands. Experimentally produced hypofunction and hyperfunction are paralleled closely in cases of hypofunction and hyperfunction of the parathyroid glands of man. Examples of cases of hypoparathyroidism and hyperparathyroidism are presented.

Bibliography

1. Erdheim, J.: Tumor des Epithelkörperchens. Beitr. z. path. Anat. u. z. allg. Path., 33:214-218, 1903.
2. Erdheim, J.: Über den Kalkgehalt des wachsenden Knochens und des Callus nach der Epithelkörperchenexstirpation. Frankfurter Ztschr. f. Path., 7:175-248, 1911.
3. Gley, E.: Note sur les fonctious de la glande thyroïde chez le lapin et chez la chien. Compt. rend. Soc. de biol. s., 3, 9:843-847, 1891.
4. Koch, W. F.: On the occurrence of methyl guanidine in the urine of parathyroidectomized animals. Jour. Biol. Chem., 12:313-315, 1912.
   Toxic bases on the urine of parathyroidectomized dogs. Jour. Biol. Chem., 15:43-63, 1913.
5. McCallum, W. C., and Voegtlin, C.: On the relation of tetany to the parathyroid gland and to calcium metabolism. Jour. Exper. Med., 11:118-151, 1909.
6. Mandl, Felix: Therapeutischer Versuch bei einem Falle von Ostitis fibrosa generalisata mittels Exstirpation eines Epithelkörperchentumors. Zentralbl. f. Chir., 53:260-264, (January) 1926.
7. Pemberton, John deJ., and Geddie, K. B.: Hyperparathyroidism. Ann. Surg., 92:202-211, (August) 1930.
8. Vassale, G., and Generali, F.: Fonction parathyréoïdienne et fonction thyréoïdienne. Arch. ital. d. Biol., 33:154-156, 1900.
9. Wilder, R. M., Higgins, G. M., and Sheard, Charles: The significance of the hypertrophy and hyperplasia of the parathyroid glands in rickets and osteomalacia. Ann. Int. Med., 7:1059-1069, (March) 1934.

EDITORIAL

MINNESOTA MEDICINE

Official Journal of the Minnesota State Medical Association

Published by the Association under the direction of its Editing and Publishing Committee

EDITING AND PUBLISHING COMMITTEE

J. T. Christison, Saint Paul
A. S. Hamilton, Minneapolis
E. M. Hammes, Saint Paul
T. A. Peppard, Minneapolis
Waltman Walters, Rochester

EDITORIAL STAFF

Carl B. Drake, Saint Paul, Editor
W. F. Braasch, Rochester, Assistant Editor

Annual Subscription—$3.00. Single Copies—$0.25
Foreign Subscriptions—$3.50.

The right is reserved to reject material submitted for editorial or advertising columns. The Editing and Publishing Committee does not hold itself responsible for views expressed either in editorials or other articles when signed by the author.

Classified advertising—five cents a word; minimum charge, $1.00. Remittance should accompany order.

Display advertising rates on request.

Address all communications to Minnesota Medicine, 2642 University Avenue, Saint Paul, or 324 Fourth Avenue South, Minneapolis. Telephones: Nestor 1381 and Dupont 1013.

BUSINESS MANAGER
J. R. Bruce, Saint Paul

Volume 18 FEBRUARY, 1835 Number 2

Simplified Diphtheria Prevention

A study in the allocation of diphtheria mortality by age groups in the State of Minnesota since 1915 reveals the appalling fact that about 45 per cent of all deaths from the disease still occur under five years of age. As a result of immunization, Schick testing, and detection of carriers by culture, the mortality in the group of infected school children ranging from five to ten years of age has declined in Minnesota during the past twenty years from 35 to 8 per cent. It is obvious that more attention must be given to earlier, more adequate, and more far reaching immunization if the mortality for the first five years of life is to be reduced. The opportune time for employing this procedure is the age of six months. In the past there has been some difficulty in accomplishing immunization due to the required multiplicity of inoculations with toxin-antitoxin and formaldehyzed toxin (toxoid).

Recent observations on the use of alum-precipitated toxoid indicate that immunity against diphtheria may be established in a high percentage of individuals inoculated with one dose of 0.5 c.c. of this more concentrated antigen. Personal experience reveals an appreciably higher percentage of negative Schick tests after the use of 0.75 c.c. Its efficacy is attributed to its relative insolubility, which results in a slow absorption and a theoretically prolonged antigenic stimulation. The advantages of a single dose method of immunization are apparent, provided the immunity so established can be shown to be as lasting as that produced by the use of multiple doses of toxoid. The hazard of abscess formation in about one per cent of cases may, however, be a deterrent to the use of this new antigen.

In spite of the slight possibility of an abscess formation following the single injection of the alum precipitated toxoid, this preparation is destined to have a wide field of usefulness in public health projects, more so if this objection can be further minimized.

The older method of giving three injections of toxoid, however, gives a higher percentage of immunization and, not being fraught with the admittedly slight possibility of abscess formation, is therefore better adapted to private practice.

E. S. Platou, M.D.

Social Idealism

A world without poverty, disease, unemployment, neglected and crippled children, and old age would be ideal, indeed. Their very existence, however, provides the urge for individual initiative. To imagine that the appropriation of funds by a paternalistic State or Federal Government can solve the problems presented by these evils is fantastic.

The Health Insurance Bill, drawn up by the American Association for Social Security, which is to be submitted to the various state legislatures, and the Wagner Bill already submitted to Congress are outstanding examples of the trend of legislation stimulated by hard times. This Wagner Bill provides for Federal subsidies to States making provision for equal sums for the relief of old age, unemployment, dependent and crippled children, and maternal care. Health insurance is evidently to be handled by the State without Federal subsidy. It is well to reflect that the millions of dollars involved are derived from direct or indirect taxation and not from the brimming coffers of a generous government.

The proposed extension of the paternalistic form of government strikes at the very foundations of our economic structure. If the government can care for all these evils incident to existence, what becomes of individual initiative and responsibility? What need for thrift, if old age is provided for? If elderly parents and neglected children will be provided for, there is less need for the family unit.

And how are the necessary funds to be raised? Taxation of pay rolls, high taxes in general and the popular cry of "soak the rich" only serve to cripple industry and prevent expansion.

There is a distinct need of a strengthening of our moral fiber as citizens. There is too much evidence of a desire to get something for nothing and to shirk individual responsibility. The choice of political leaders in some states and lobbies of organized minorities such as that of the American Legion are illustrative. The Townsend plan only indicates to what extremes the followers of a quixotic leader can go.

It behooves intelligent citizens and those who believe the only way out of our economic situation is individual initiative and hard work to oppose the present day tendency to shift responsibility to a beneficent government. An important decision rests with Congress and the members of our State Legislatures.

In Memoriam

Each year a certain number of our members fall by the wayside. Too often the event does not receive a suitable recording in the pages of our journal. More often than not two months elapse before the editorial office receives any notice of the fact.

A record of the life of a physician written by a close friend is much more likely to give due credit to the outstanding qualities of the departed one than any enumeration of events in that life narrated by a total stranger.

When a member of a county medical society passes away a committee is usually appointed from among the intimate professional friends of the deceased to draw up a suitable record of his activities and character. There should be no exceptions. This record should be suitable for publication in the journal where it will serve as a permanent record. Professional friends of non-members or those retired from practice must be counted upon to perform this tribute.

May we not ask the coöperation of the secretaries of the component societies who are among the first to receive news of the loss of a member to arrange promptly for the preparation and submission of a suitable memorial for publication in the pages of Minnesota Medicine? We also make a plea to the friends of non-members to perform a similar final act of courtesy towards their departed comrades.

OF GENERAL INTEREST

Dr. M. L. Mayland, Faribault, is spending the winter in Florida.

* * *

Dr. Laura A. Lane, formerly of Northfield, is now located at Ann Arbor, Michigan.

* * *

Dr. Lillian L. Nye, Saint Paul, was elected to membership in the American Academy of Pediatrics last fall. Her present address is Cortland, New York.

* * *

Dr. Royal V. Sherman of Knapp, Wisconsin, has become associated with the Bratrud Clinic, Thief River Falls, in the department of internal medicine.

* * *

Dr. Angie G. Stiles, Carleton College, Northfield, was married last summer and is now in Europe taking postgraduate work. She will return in October, 1935.

* * *

Dr. S. B. Haessly, Faribault, recently sustained a fracture of the thigh and is confined in St. Lucas' Hospital.

* * *

Dr. Walter P. Gardner, specialist in nervous and mental diseases in Saint Paul for a number of years, was appointed superintendent of the Minnesota State Asylum at Hastings, Minnesota, and took charge of the hospital, January 1, 1935.

* * *

Dr. W. E. Ground of Superior, Wisconsin, has just completed fifty-two very active years of practice in medicine and surgery. He is still not satisfied, and left on a trip to England, January 18. He expects to do special cancer study in London and elsewhere.

* * *

Dr. Louis B. Wilson, director of The Mayo Foundation, was married January 3, 1935, to Miss Grace McCormick, formerly of Philadelphia, but recently in charge of a playground project in Walnut Hill, a suburb of Rochester, Minnesota. A wedding trip to Florida followed the ceremony in Pittsburgh.

Dr. C. H. Holmstrom of Warren, Minnesota, returned recently from Boston, Massachusetts, where he attended the Harvard post-graduate course in surgery given at the Massachusetts General Hospital. Returning home he visited various hospitals in the larger cities.

* * *

Dr. L. W. Barry of Saint Paul, an associate professor of gynecology and obstetrics at the University of Minnesota, was guest speaker before the Interurban Academy of Medicine meeting at Duluth on the evening of January 16. His subject was, "The Medical and Surgical Aspects of Dysmenorrhea."

* * *

St. Mary's Hospital staff, Duluth, held its annual meeting, with a dinner served in the auditorium of the nurses' home, for ninety doctors and guests. Dr. Gersham Thompson of the Mayo Clinic was the guest speaker. He discussed the present interesting developments in transurethral resection of obstructed prostates. Dr. J. R. Kuth was elected as chief of staff.

* * *

Dr. Elliott C. Cutler, Moseley Professor of Surgery at Harvard University Medical School, will give the second lecture in the annual Judd Lectureship in Surgery on Tuesday, February 19, in the auditorium of the Chemistry Building at the University of Minnesota at 8:15 P. M. The subject of Dr. Cutler's lecture will be "Total Thyroidectomy for Heart Disease." Dr. E. Starr Judd who endowed this lectureship in Surgery is a graduate of the University of Minnesota of 1903.

* * *

The Interurban Academy of Medicine (Duluth and Superior) at its regular meeting, January 16, honored two members, presidents respectively of their state medical societies, Dr. Thomas O'Leary of Wisconsin and Dr. W. A. Coventry of Duluth. Dr. W. E. Ground of Superior, Wisconsin, a past president of the Wisconsin association, pointed out that this is the second time that these lake port cities have synchronously enjoyed this honor. Dr. Ground's administration for Wisconsin coincided with that of the late Dr. W. H. Magie of Duluth, elected in 1907, whose administration covered the year 1908.

* * *

Blue Earth County is trying a new experiment with the county work, in that all the doctors are county physicians. There is a stipulated sum set aside for the year, and each doctor is paid according to the amount of work he turns in. Every three months all the accounts are checked up, and the doctors paid according to the sum set aside. The county takes care of all hospital work, venereal and chronic cases. The SERA takes care of acute cases outside the hospital. The SERA work has been so unsatisfactory that many of the doctors feel it would be much better if all the medical work would come under county supervision. It is to be seen how this plan will work out.

* * *

St. Luke's Hospital, Duluth, held its annual staff meeting, with a dinner served to about eighty doctors and internes, on the evening of January 17. An alert audience was awaiting as guest speaker Dr. H. E. Robertson of the Mayo Clinic. From Olmsted County came the "Byrdlike" report that not even the wind (not to mention trains or buses or cars) was moving, and unhappily, H. E., with most of southern Minnesota, was snowbound! The late Whittier was recalled, and an autopsy held on his memory, all of which shows the provocative propensities and perversity of our times. Dr. J. R. Manley was elected chief of staff.

* * *

Dr. Emil Goetsch of Brooklyn, Professor of Surgery at the Long Island Medical College and Surgeon-in-Chief of the Long Island College Hospital, will address the thirteenth annual Foundation Dinner meeting of the Minneapolis Surgical Society to be held at the Minneapolis Club Thursday, February 7, 1935. The subject of his address will be "Criteria of Operability in Goiter Patients." Following the address Dr. Goetsch will be presented with an honorary membership in the Society.

Dr. Goetsch will also address the Hennepin County Medical Society at 1 P. M., Wednesday, February 9, and the students of the medical school on the campus of the University of Minnesota at 2 P. M., Thursday, February 10.

* * *

At the annual meeting of the Staff of Ancker Hospital, Saint Paul, on January 23, 1935, the Staff was called upon to decide whether its members would accept compensation for their services. There was some reason to believe that a sum of $20,000 or $30,000 might be available to partially compensate the ninety staff members, although just how this sum would be raised or how long it would be continued, no one actually knew. After considerable discussion as to how the remuneration would be handled, whether in direct pay on a basis of years of service and character of service rendered or in the form of annuity insurance, the Staff voted unanimously against changing the precedent of some sixty-eight years' standing whereby the medical profession of Saint Paul has contributed gratuitously its services to the patients in Ancker Hospital.

* * *

Correction—The news item concerning Dr. C. W. Froats, published in the January number of Minnesota Medicine, stated that he was "of the Duluth Clinic." This should have read "of the Bratrud Clinic, Thief River Falls."

MEDICAL ECONOMICS

Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association

B. J. Branton, M. D. W. F. Braasch, M. D., Chairman J. C. Michael, M. D.

Report of The President

The text of President Roosevelt's long awaited message on social security presented to a public that has been much harangued of late on the subject of inequalities in the distribution of medical care, a very interesting and significant pronouncement on radicalism in general and on Health Insurance in particular.

In the two statements from the text which are quoted below are to be found important aid and reassurance for those in the medical profession who feared radical proposals for the socialization of American medicine. The influence and advice of the experts who represented the American Medical Association on the advisory boards to the President's Committee on Economic Security is also abundantly evident.

Says the President:

"It is overwhelmingly important to avoid any danger of permanently discrediting the sound and necessary policy of Federal legislation for economic security by attempting to apply it on too ambitious a scale before actual experience has provided guidance for the permanently safe direction of such efforts.

"The place of such a fundamental in our future civilization is too precious to be jeopardized now by extravagant action. . . .

". . . I am not at this time recommending the adoption of so-called Health Insurance, although groups representing the medical profession are coöperating with the Federal government in the further study of the subject and definite progress is being made."

So long as the Federal government consults and "coöperates" with groups that truly represent the medical profession, precipitate action which will endanger permanent progress in care of the sick need not be feared.

Special Session

That the situation still holds grave possibilities is indicated in the call, issued just as we go to press, for a special meeting of the House of Delegates of the American Medical Association. Following is the message sent, January 22, to all members of the House:

> To the Members of the House of Deligates of the American Medical Association:
>
> In compliance with the official request of the Board of Trustees that the House of Delegates be convened in Special Session, I, as Speaker, under authority of Chapter III, Section 2, of the By Laws, hereby officially call the House of Delegates of the American Medical Association to convene in special Session in the city of Chicago, State of Illinois, at 10:00 a. m., Central Standard Time, on the fifteenth day of February, 1935.
>
> The business to be transacted at this Special Session shall be limited to the consideration of the social and economic policies of the Association as related to the pending and proposed legislation, to sickness insurance and to other matters which may be submitted by the Board of Trustees.
>
> The House shall remain in session, recessing from day to day, until its deliberations are concluded.
>
> Signed and issued in San Francisco, California, January 21, 1935.
>
> Frederick C. Warnshuis, M.D.
> Speaker, House of Delegates
> American Medical Association

Anti-Vivisection is Real Menace—Dr. McEachern

Dr. Malcolm T. McEachern, of Chicago, associate director of the American College of Surgeons and Director of Hospitals, visited the Twin Cities recently to arrange for a sectional meeting of the College to be held March 18 and 19, in Saint Paul. He found time between appointments and conferences to talk about a number of things, among them anti-vivisection.

"The real menace to the welfare of medicine right now," said Dr. McEachern, "is the renewed activity of the anti-vivisectionists."

A $6,000,000 gift to the National Anti-vivisection Society has brought opportunists, of all brands, flocking to the Society's standard. Bills will be introduced into every possible state legslature, this session, under the guise of humane legislation, probably with the purpose, first, of procuring exemption of dogs from animal experimentation.

Irene Castle, Leader

The fight is on already in Chicago, where Mrs. Irene Castle McLaughlin, once a dancer, is leading a very energetic campaign to prevent use of unclaimed dogs from the city's pound for experimentation.

The campaign is not confined to the platforms of women's clubs and welfare organizations. It has been carried into the churches and a surprising number of ministers have been prevailed upon to take up the cause of the dogs as against suffering human beings.

It is to be noted, also, that the Chicago newspapers that belong to Mr. William Randolph Hearst have also thrown their headlines and editorials to Mrs. McLaughlin's assistance.

The question will be settled with the election of aldermen this spring. Anti-vivisectionists, with the backing of their large gifts, appear to be sure of influencing a considerable number of Chicago's aldermen.

As to Health Insurance

Says Dr. McEachern:

"The College of Surgeons has only established principles upon which any scheme for pre-payment for medical or hospital service should be guided; nothing more.

"Personally, I believe there will have to be some such plan or series of plans. But it should apply only to the lowest income groups and it should be limited to payment for doctors' and hospital bills.

"It seems extremely unlikely, judging from reports from well informed men, that anything will be done on a large scale now to promote health insurance.

"It is likely, however, that there will be sporadic attempts here and there among the states to experiment with health insurance.

"Conditions in each community differ so much from other communities that a uniform prepayment plan seems hardly possible.

"If times continue to get better there will probably be less and less talk of any radical change—the reason, probably, why Secretary of Labor Frances Perkins and her associates, especially, wish to lay the foundations now for a general program of social security."

Questionnaire

Why Does The Physician Oppose Health Insurance?

When the lay legislator or lawyer or politician asks what is the real objection to Health Insurance, is the medical man thus interrogated going to bluster and become inarticulate? Too often he does just that—not because his feeling on the matter is not honest and based upon truth. But there is a specious sweet reasonableness and a false humanitarianism about the arguments for health insurance that too often halt his reply.

The questions and answers that appear from time to time in this section are designed to assist the average practicing physician in this predicament.

The first series, which appeared in the December issue, covered some of the most frequent questions in their more usual form. The following are sure to be asked sooner or later, also, and perhaps the appended answers will encourage him to explain clearly the medical position and point of view. (We acknowledge our indebtedness to the fine material, including the Catechism on Sickness Insurance, prepared by the Bureau of Medical Economics of the American Medical Association.)

Who Wants It?

Question.—How can you oppose pre-payment plans for medical care when so many people are asking for them?

Answer.—The people who are asking for prepayment health insurance are neither the eligible patients nor the doctors who take care of them. In most of the countries where health insurance is now established, its introduction was opposed by both groups. The first advocates for sickness insurance, have, almost always, been social workers and philanthropists. "These groups," says Dr. Leland in his Catechism, "see in sickness insurance a simplification of their work in providing medical relief. Neither are they blind to the fact that the introduction of a system of sickness insurance will involve employment of large numbers of such social workers."

One Million Dollars a Day

Question.—But if Organized Medicine has shown itself to be indifferent to the welfare of these low income groups who, naturally, can't be trusted to know what's best for themselves, then why should they object if the social workers assume the responsibility?

Answer.—It is untrue and notably unjust to say that Organized Medicine has been indifferent to the welfare of these low income groups. A very conservative estimate, based upon limited studies, places the value of services donated by the physicians of the United States to the care of indigents and low income classes during the last few years at about one million dollars a day. Certainly, if there is any section of the people that has not been indifferent to the problem of medical care for indigents it has been the organized medical profession of the United States. Practically every institution offering service to these classes depends for its existence upon donated services of physicians.

In addition, state and county medical societies throughout the country are trying to find a sound method for giving good medical care at a price within their ability to pay to people with low incomes. A number of the experiments that offer the best promise have been originated in and are now being carried on by such societies.

In all of these experiments, however, the prime object has been to maintain the conditions on which the doctor knows good medical care depends.

The threat to good medical care has been the basis of criticism offered by physicians to wholesale plans offered by social workers, philanthropists, employers, laymen, very few of whom have shown their devotion to these same low income classes that has been shown by the medical profession.

Insurance and Preventive Medicine

Question.—But what if the practice of medicine should be hampered somewhat by organizing and regimenting it a little according to the plans of the social workers; wouldn't that misfortune be more than offset by the fact that unlimited service would be available to encourage preventive medicine and the detection and treatment of incipient disease?

Answer.—That question can best be answered by looking at the experience of European countries, notably England and Germany. In these countries even the most enthusiastic advocates admit that sickness insurance has done little to develop or encourage measures for prevention of disease.

The insurance practitioner is too hurried and too closely restricted to spend time on immunizations and general health examinations. Such work is done better in America without sickness insurance than anywhere else in the world.

By the same token, physicians who are familiar with insurance work point out that, both in England and Germany, the physician's office is more than likely to be full of patients who are manufacturing symptoms in order to "get something out of" their insurance payments and the tendency of the over-crowded practitioner is to make light of all reported symptoms.

No advocates of insurance have ever assembled any figures to show that cancer or tuberculosis are discovered earlier and are more successfully treated on that account, in the countries having health insurance than in others.

Medical Principles

Question.—Isn't the real objection of Organized Medicine to sickness insurance bound up in the fact that physicians fear their incomes will be lowered and standardized?

Answer.—The real objective of organized medicine has always been, first, to fight disease and to guard the health of the people. In this respect it is set apart from every other association. While most other associations make the improvement of the economic conditions of their members the first object, the medical profession has always put the welfare of the indivdual and the public first. It is from this point of view and with a record of more than a thousand years' adherence to these principles that Organized Medicine approaches the problem of health insurance.

Nowhere has it declared itself as against the principle of insurance as a method of payment for medical service. It has emphatically opposed specific schemes for sickness insurance because they endangered the quality of medical service and therefore threatened the public health.

Some Causes of Professional Unrest

An article by R. G. Leland, M.D., of the Bureau of Medical Economics of the American Medical Association, which appeared recently in the *Journal of the Iowa State Medical Society,* is worthy of detailed consideration.

"Medical Economics," says Dr. Leland, "is, in the minds of some, a matter solely devoted to the increase in the business of a physician, the size of his practice, and the increase in the percentage of his collections. It has a much larger scope, and the purely business side of medicine is merely an incidental or subsidiary feature."

Contract Practice

Among the causes of unrest that have appeared during our economic depression, Dr. Leland enumerates the following beginning with contract practice.

Although it must be admitted that some forms of contract practice are legitimate, necessary and ethical, nevertheless he makes the following criticisms in regard to this form of practice:

"Contract practice, with its solicitation, its advertising, underbidding and racketeering, and its commercial, competitive features, in my opinion has spoiled more good physicians than any other one form of medical practice. It is because of the undesirable, dangerous, destructive features of contract practice that we find it among the leading causes of professional unrest today.

"Contract practice introduced the commercial competitive basis of the practice of medicine. Under those conditions, physicians are not allowed to place, uppermost and foremost, their ability to diagnose and to treat disease. They compete on a commercial basis, on a basis of doing a certain amount of work for a certain sum, and if they are not successful, one of their competitors is awarded the contract the next year, because he will do it cheaper per piece than they. The following year, they strike back at the competitor by offering to do the same work for less money or to do more for the same money."

Medicine Deteriorates

Regarding attempts to mechanize, to socialize, or to sovietize medicine, Dr. Leland makes the following statement:

"They are, perhaps, the strongest of the disturbing elements to physicians today. It is hard to tell just exactly what might happen were such an event to occur in these United States, but I can state, truthfully, that I see some comfort in the fact that I believe the American people desire their own physicians. They do not want the kind of medicine that is dealt out mechanically. They do not realize as well as we do what the mechanization and sovietization of medicine means to them, but it is for us, the physicians of these United States, who, by tradition, training, experience, and ability, know what happens to the quality of medical care when socialization of medicine takes place, to point out how the quality of care deteriorates, under such a system. This deterioration has taken place in all the sickness insurance systems in Europe, perhaps to the least extent under the system that is in vogue in Great Britain."

Group Hospitalization

Of the scheme for group hospitalization contracts, he says that sooner or later they will lead to health insurance, with its attendant ills. He says:

"Hospitals should raise the amount necessary to meet their financial obligations by some other way than by urging the poor and the low income group people to carry a portion of the hospital debt retirement program."

He makes the following suggestions in regard to the solution of our present problems:

"It seems to me that the effects of all of these disturbing elements ought to be fairly clear. One of the first effects should be the creation of a strong, united effort on the part of the medical profession to resist all of these socialization efforts and to maintain, as rigidly as possible, the quality of medical service. We do not deny that there may be some weaknesses in the method used for the practice of medicine today, but is it necessary that the entire structure of medicine be destroyed, that the method of practicing medicine in the United States be overturned, in order that we correct certain minor deficiencies which exist here and there?"

The Doctors' Tradition

"One of the major tasks, however, of the medical profession is to unite physicians in a strong resistance against a common foe, not solely for the sake of professional gain, but primarily to preserve that type of medical care which is best for the public. If we keep uppermost in our minds the fact that we as physicians have a tradition, that we as physicians have an obligation to society, that we have always enjoyed a freedom for research, that we are the only ones who are capable, by reason of training, experience, and licensure, to pass upon medical problems, then it seems to me it ought to be clear that the medical men throughout these United States should unite to keep medicine as a profession and to deliver the best medical care possible to the people of the United States."

County Officers' Meeting

The County Officers' Conference for 1935 is scheduled for Saturday, February 23, at the Hotel Lowry, in Saint Paul.

From the point of view of medical organization and the handling of social and economic problems that affect medicine in Minnesota, this conference is the most important of the year.

Officially, it is a meeting of officers of county and district medical societies of the state for joint administrative problems. But all members are invited to attend and the program as now tentatively arranged will be devoted chiefly to great practical problems that face medical men in Minnesota today.

One is the problem of malpractice insurance, the increasing malpractice litigation, its causes and results in the lessened good repute of the profession and in steadily advancing rates for malpractice insurance.

Another is the medical relief problem, which will be thoroughly discussed by officials from the SERA and by councilors and committee chairmen of the state society who have kept a guiding hand on relief policies of the association.

State legislation as it affects the practice of medicine in Minnesota and a consideration of current schemes for Health Insurance are also scheduled.

Dr. M. C. Piper, Rochester, will preside at the morning session which opens with a breakfast for secretaries at 8 A. M.

Dr. E. A. Meyerding, Saint Paul, executive secretary, will preside at the luncheon session.

Northwest Conference

The Northwest Medical Conference originated under the auspices of the Minnesota State Medical Association years ago.

It was designed by its founders to serve as an opportunity for the yearly exchange of ideas and discussion on common problems of officers of state medical societies in this region.

It has grown to be one of the most distinguished and notable conferences on the social and economic problems of medicine in the United States. Its representatives include officers and councilors from Michigan and Indiana to Colorado and Wyoming.

The program allows time for informal discussion as formerly but it includes, also, a series of important formal papers which are awaited each year with interest by those who are shaping the public policies of medicine in the United States.

The conference continues to be held in Saint Paul each year, on the day following the County Officers' Conference, and each year more of the county officers who come to Saint Paul for their Saturday meeting remain for the Sunday gathering also.

Following is the tentative 1935 program. Dr. Philip Kreuscher, Chicago, president of the Conference this year, will be the presiding officer. The program was arranged under the supervision of Dr. Robert L. Parker, Des Moines, secretary of the Conference.

Program

8:30 Breakfast
Informal Discussion

9:30 Opening Remarks—Philip H. Kreuscher, M.D., Chicago, Ill.

9:45 The Problem of Medical Care:
For the Indigent—E. M. Farr, M.D., Billings, Mont.
Discussion—Rolla Packard, M.D., Chicago, Ill.; E. C. Baumgarten, M.D., Detroit, Mich.
For the Unemployed—Charles H. Philfer, M.D., Chicago, Ill.
Discussion—E. E. Wheedon, M.D., Sheridan, Wyo.; E. J. Goodwin, M.D., St. Louis, Mo.

10:45 Sickness Insurance—Mr. A. M. Simons, Bureau of Medical Economics, American Medical Association
Discussion—Gordon F. Harkness, M.D., Davenport, Ia.

11:15 Medical Journal Advertising—Mr. Harvey Sethman, Denver, Colo.
Discussion—A. S. Hamilton, M.D., Minneapolis, Minn.; B. R. Corbus, M.D., Grand Rapids, Mich.

11:45 The New Set-up of the State Board of Health of Indiana—Thurman B. Rice, M.D., Indianapolis, Ind.
Discussion—A. J. Chesley, M.D., St. Paul, Minn.

12:15 Dinner

1:30 Medical Legislation
National--Mr. Thomas A. McDavitt, American Medical Association
Discussion—C. B. Wright, M.D., Minneapolis, Minn.
Local—R. L. Sensenich, M.D., South Bend, Ind.
Discussion—John R. Neal, M.D., Springfield, Ill.; A. W. Anderson, M.D., Lexington, Nebr.

2:30 Survey of Basic Science Laws—W. G. McGee, M.D., Watertown, S. D.
Discussion—Fred Moore, M.D., Des Moines, Ia.; L. W. Larson, M.D., Bismarck, N. D.

3:00 Postgraduate Medical Education—D. J. Glomset, M.D., Des Moines, Ia.
Discussion—Mr. Tom Hendricks, Indianapolis, Ind.

3:30 Scientific Exhibits—W. A. O'Brien, M.D., Minneapolis, Minn.
Discussion—Mr. George Crownhart, Madison, Wis.; Thomas A. Burcham, M.D., Des Moines, Ia.

4.00 Commercial Exhibits—Harold Camp, M.D., Monmouth, Ill.
Discussion—J. D. McCarthy, M.D., Omaha, Nebr.; J. F. Hassig, M.D., Kansas City, Kans.

Medical Practice in Utah

A pamphlet entitled, "A Survey of the Medical Services and Facilities of the State of Utah —1934, December," arrived the other day. The survey was made by members of the Committee on Medical Economics, Public Policies and Relations of the Utah State Medical Association and the Secretary. Such surveys are being made by various states and should be a guide in any action which may be taken by organized medicine.

There is an apparent uniformity of results in reports of this kind. The economic status of the profession in Utah is probably representative of most of the sparsely settled states in the west and is not dissimilar from conditions in any of the states other than those which are largely industrial.

Incomes Reduced

It is of interest to note that the gross income of physicians in 1933 averaged $3,486, in comparison with $9,986 in 1928. The reduction of average gross incomes from 1928 to 1933 equalled 40 per cent.

The average net income for 1928 was $6,131; for 1933, $3,038, or about $250 per month. The reduction of average net incomes amounted to 50 per cent.

The average expenses dropped 21 per cent as compared with the gross income drop of 40 per cent, or a net income drop of 50 per cent. The average professional income expense in 1933 was 46 per cent.

In 1933, 23.6 per cent of the physicians of the state had a net income under $2,000 per year and 61 per cent had incomes under $3,000.

Little Idle Time

The report of the Committee on the Cost of Medical Care stated that much of a physician's time is idle. This survey shows that the average number of hours of work per week was 63.7. In several cases, it was 70 hours or over and one physician averaged 104 hours per week throughout the year. A survey as to the net income per hour of work showed the average to be 97 cents per hour, which does not compare favorably with bricklayers and masons, and so forth.

It is of interest that the total gross income of 510 physicians in Utah was $2,187,000, or $5.50 per capita of the population. In 1928 it was $4,918,000, or $9.70 per capita of the population. This does not seem to be an excessive amount for care of health.

A report from Salt Lake County estimated donations of medical services by physicians for which they received no pay as $500,000 per year, or three times the amount of the Community Chest for Salt Lake City.

It is to be noted that in all charity agencies which have to do with the health of patients, practically everyone else except the physician is paid for his services. Supplying such free service by the physician is not a simple donation of time; it involves the actual expenditure of money by him for expense. It is estimated that in the first three months of 1934, 29 per cent of all medical work in the state was charity to those unable to pay. However, in several counties this reached as high as 75 or 80 per cent of all the work done.

Recommendations

The recommendations for any proposed plan for medical care included the following principles:

1. Freedom of choice of physicians.
   Plan to be opened to all qualified members of local profession.
   Plan to be identified with present organizations.
2. Control of Medical Service by State and County Societies.
   No restrictions on treatment or prescribing except those formulated by these bodies.
3. Confidential relation between patient and physician.
4. Divorce from unemployment insurance.
5. No third party between patient and physician in medical relation.
   No third party between patient and physician in financial relation except the medical societies.
6. Limited to low income groups.
7. Care of indigent and marginal groups to be provided by state and profession jointly.
   Determination of economic classes by joint agreement.
8. Adequate compensation of physicians.
9. Provision for preventive medicine and health education.
10. Maintenance and improvement of professional standards.
    Education of physicians.
    Check on the unscrupulous.

11. Provision for coöperative research.
12. Fee basis (modified) for payment to physician.
13. Immediate partial cost to be borne by patient.
14. No commercial solicitation.
15. Master contract by state association; subcontract by county society.
16. Initial plans to cover only employed groups with payroll deduction.

Detroit Is Grateful

From *The Detroit Medical News*, bulletin of the Wayne County Medical Society, for January 14:

"The Medical Service Bureau of the Wayne County Medical Society has demonstrated that the medical profession can meet today's challenge of good medical care for all—not through insurance, not through government or political agencies, but through its own organization, the County Medical Society.

"The Bureau has brought complete medical care (including services of physicians, hospitals, dentists, nurses and pharmacists) to 1,541 (as of Jan. 7, 1935) employed wage earners of small means and has arranged plans for all of the applicants whereby the accounts are being liquidated in small installments.

"Because the Bureau is being controlled by the professions, free choice of doctor and preservation of the fundamentals of good medical service are assured.

"The average wage earner does not want charity. Having a job, he is ineligible to receive help from charitable organizations. And yet, because of unemployment periods, short hours and reduced pay schedules, he may have had his financial reserves depleted and be unable to meet a medical crisis, if it should arise, and involve a considerable sum of money. While he may be able to pay for a two-dollar office call, it is impossible for him to meet, in one payment, a protracted illness costing, say, twenty-five to two hundred dollars.

"The purpose of the Medical Service Bureau is to modify the financial barrier of cost, and give this group of people the medical care they are properly entitled to receive.

"It is an honest attempt to help the in-between fellow. It now permits the employed wage earner in Detroit, and Wayne county, to get complete medical care for himself and his family without having to resort to the charity clinic or dispensary.

"How do the wage earners react to the services of the Bureau? The experience so far is that the patient is greatly relieved to learn that complete service will be rendered and NOT THROUGH CHARITY. Patients have shown their gratitude in a very substantial manner by contributing in small installments of one, two, or three dollars (occasionally a little bit more) the surprising total of $35,643.67 (as of Jan. 7, 1935)."

The Medical Service Bureau of the Wayne County Medical Society is an agency of the society, as the above quotation indicates. It assists employed patients of low income to secure needed medical care from the doctors and hospitals of their own choice on terms that they are able to meet. Many of the large employers of Detroit are assisting the agency by actual financial assistance to their employees or by bringing the service to the attention of their employees. Medical economists all over the country are watching with great interest this and other similar experiments undertaken by various state and county units of organized medicine.

State Meeting

The progress, to date, of preparations for the Eighty-second Annual Meeting of the Minnesota State Medical Association, to be held in the Minneapolis Auditorium, June 24, 25, and 26, is worthy of note.

Completion of program plans waits upon the February 2 meeting of the Committee on Scientific Assembly.

The tentative schedule worked out at previous meetings calls for some radical program departures and novelties.

Part of these are concerned with the joint sessions with the American Association for the Advancement of Science, which holds its summer meeting at the University of Minnesota during the same week.

The first of these joint sessions will be held at the Auditorium, Tuesday morning. It will take the form of a symposium on anemia and a series of world-famous medical men will be brought by both organizations for the occasion. The other will be an evening meeting at the University, Tuesday evening.

The "Three A. S." has purposely left its afternoons open so that its members may visit the exhibits and demonstrations at the Auditorium.

Scientific demonstrations and exhibits have become a distinctive feature of the Minnesota meeting and will have especial emphasis this year. Ramps and corridors bordering the exhibit halls all will be utilized for demonstrations and individual moving pictures and exhibitions.

An unprecedented number of famous guest speakers will be available for this meeting, also, owing to the fact that several other scientific societies have followed the lead of the Minnesota Radiological Society which, last year, established a lectureship for the state meeting. Five other societies, the Northwest Pediatrics Society, the Minneapolis Surgical Society, the Minneapolis Clinic Club, the Minnesota Academy of Medicine and the Northwest Ophthalmological Society, will provide out-of-state speakers besides those provided by the Hennepin County Medical Society, the Minneapolis Citizens' Aid Society, the Minnesota State Medical Association, and the Radiological Society. These will be in addition to those secured by the "Three A. S."

The Annual Meeting is one of the great yearly projects of the association, an essential feature of the post-graduate work of the association and an indispensable means of tightening the bond which holds physicians of the state together and unites them in defense of medical standards and the welfare of the public.

It has gained a national reputation for its distinctive quality and exceptional attendance in the last few years—a reputation which may be measured by its popularity with commercial houses as a means of reaching the medical profession of this part of the country.

As much exhibit space as the total sold in Duluth last summer has already been engaged or paid for in advance by approved firms who cater to physicians. The total number of spaces sold is thirty and the names of exhibitors, listed below, should be remembered as good friends of the profession by physicians:

Abbott Laboratories
North Chicago, Ill.

C. F. Anderson Co., Inc.
Minneapolis, Minn.

Bard-Parker Co., Inc.
Danbury, Conn.

Bilhuber Knoll Corp.
Jersey City, N. J.

Brown & Day, Inc.
St. Paul, Minn.

Cambridge Instrument Co.
New York, N. Y.

Chippewa Springs Corp.
Minneapolis, Minn.

Jos. E. Dahl Co.
Minneapolis, Minn.

DeVilbiss Co.
Toledo, Ohio

Gerber Products Division
Fremont, Mich.

Health Products Corp.
Newark, N. J.

Kellogg Company,
Battle Creek, Mich.

Lea & Febiger, Publishers
Philadelphia, Pa.

Lederle Laboratories
New York, N. Y.

Mead Johnson Co.
Evansville, Ind.

Mellin's Food Co.
Boston, Mass.

Medical Protective of Fort Wayne
Wheaton, Ill.

Wm. S. Merrell Co.
Cincinnati, Ohio

Merck & Co.
Rahway, N. J.

Minneapolis Artificial Limb Co.
Minneapolis, Minn.

V. Mueller and Co.
Chicago, Ill.

Petrolagar Laboratories
Chicago, Ill.

Physicians & Hospitals Supply Co.
Minneapolis, Minn.

Sharp & Smith
Chicago, Ill.

E. R. Squibb & Sons
New York, N. Y.

U. S. Hospital Supply Co.
Minneapolis, Minn.

Winthrop Chemical Co.
New York, N. Y.

We Apologize

The writers of these columns regret if any comment made in the January issue regarding the newspaper article which appeared concerning removal of school children's tonsils in Ashland, Wisconsin, caused any unfavorable reaction. The surgeons in charge, in Ashland, have pointed out to us that the operations were performed only after careful examinations over a long period of time and without any haste or anything suggestive of wholesale surgery. They have also pointed out that the work was done at the request of the Emergency Relief Administration and the fees charged were nominal under these circumstances.

We wish, therefore, to retract any invidious comment, which was made from the information in the newspaper article alone and without careful investigation.

In Memoriam

Joseph Albert Hedding

1883-1934

Dr. Joseph Albert Hedding, a well known practitioner in Minneapolis, with offices in the Medical Arts Building, died December 26, 1934, of hypertension and arteriosclerosis.

Dr. Hedding was born in Minneapolis on March 5, 1883, graduated from South High School and from the Hamline Medical School in the class of 1906. After serving one year as interne at St. Joseph's Hospital, St. Paul, he located in Hope, North Dakota, where he practiced until 1912, when he removed to Minneapolis and practiced there continuously until his death. He was married in 1907 to Ada Benjamin of Minneapolis who, with three sons, survives him. He was a member of the Hennepin County Medical Society, the Minnesota State and the American Medical Associations and the Phi Rho Sigma medical fraternity.

Dr. Hedding had the faculty of making friends. His genial and sympathetic nature, combined with his skill, won for him a large practice. He enjoyed sports of all kinds and won honors in bowling on several occasions at the Minneapolis Athletic Club, of which he was a member.

Dr. Hedding was buried from St. Thomas Church and at St. Mary's Cemetery. The honorary pallbearers were members of the Hennepin County Medical Society.

Robert Williams, M.D.

Arthur F. Kilbourne

1856-1934

Dr. Arthur F. Kilbourne died at his home on November 30, 1934. He was born at Keokuk, Iowa, January 5, 1856, where he received his early education. He graduated from the University of the City of New York in 1883. He spent some time at the hospital on Wards Island in the City of New York, and from there went to the State Hospital at St. Peter, Minnesota, where he served as assistant physician for four years.

He was appointed superintendent of the Rochester State Hospital on June 6, 1889, twelve years after that institution had been established, and served as superintendent of this institution until the time of his death. Under Dr. Kilbourne's management the Rochester State Hospital became one of the best in the country. He established a training school for nurses in 1890. As a result of his administration the hospital grounds are most attractive; the wards and corridors are bright and cheerful, always attractive with a generous supply of flowers and growing plants. In fact, Dr. Kilbourne's cheerful and generous character is reflected in these things, in his endeavor to make as cheerful and pleasant as possible the surroundings of the State's unfortunate wards.

Dr. Kilbourne was a member of the local, state and national medical societies. He was a past president of the Olmsted County Medical Society and of the American Psychiatric Society.

Had he lived two weeks longer he would have completed a period of fifty years' service to Minnesota State Hospitals.

On October 9, 1888, Dr. Kilbourne was married to Miss Ella Donahower at St. Peter, Minnesota. He is survived by his wife; a son, A. D. Kilbourne; and a daughter, Katherine Kilbourne, both of Chicago.

Dr. Kilbourne was always interested in local and civic affairs and for twenty-five years had been senior warden in the Calvary Episcopal Church of Rochester, Minnesota.

Dr. Kilbourne will be remembered as a man of the highest type in his profession. He was dignified but always friendly and cheerful, with a fine sense of humor. He was eminent as a physician and a good administrator, but his friends will remember him chiefly because he was always a gentleman.

Jacob Welcome Bray Wellcome

1869-1935

Dr. J. W. B. Wellcome, for thirty-nine years a practicing physician and surgeon of Sleepy Eye, Minnesota, died at the age of sixty-five at his home, January 10, 1935, following an illness of five years.

Dr. Wellcome was born in Garden City in 1869. He was a cousin of Sir Henry Wellcome, founder of Burroughs-Wellcome Company. Dr. Wellcome graduated from the St. Louis College of Physicians and Surgeons in 1890. Following a postgraduate course at Rush Medical College, he returned to Sleepy Eye to practice with his father, Dr. J. W. B. Wellcome, Sr.

Dr. Wellcome was active in city affairs, serving in the City Council from 1913 to 1915, when he was appointed to serve the unexpired term of Albert Hauser as mayor. He continued as mayor until April, 1919, and during this period many lasting civic improvements were made in the way of extension of water and drainage facilities and the removal of telephone lines from the main street. Dr. Wellcome also served on the School Board for six years.

For years Dr. Wellcome was the local surgeon for the Northwestern Railway and was also a member of the United States Pension Examining Board. He was a member of the Redwood-Brown County Medical Society, Minnesota State and American Medical Associations.

Dr. Wellcome was married October 1, 1891, to Miss Margaret Emmerich of Sleepy Eye. He is survived by his widow and one daughter, Mrs. Lynn E. Jensen of Austin.

TRANSACTIONS *of the* MINNEAPOLIS SURGICAL SOCIETY

Stated Meeting held November 1, 1934

The President, Dr. Martin Nordland, in the Chair

GALL BLADDER DISEASE*

A Critical Clinical Study

Thorvald Peterson, M.D.

Before elucidating the subject, let us pay tribute to the vision and courage of the old pioneers who have led us to the present stage of surgery, now called the queen of arts. Zambeccari, the Italian physiologist, in 1630, removed the gallbladder from a dog and ligated the stump; the animal recovered. Michael Entmuller in 1667 concluded from experiments made by Teckop on dogs that removal of the gallbladder had no effects on the bile passages. His statement, "There are no medicines which will dissolve gallstones," undoubtedly paved the way for radical surgery of the gallbladder. The first deliberately planned operation for gallstones was carried out by Gene Louis Petit in 1743. He punctured the gallbladder and extracted the stones with the aid of forceps. In the year 1882 Bernhard Langenbeck performed the first cholecystectomy on a human being and the patient made a speedy recovery. Reidel in 1888 devised choledocho-enterostomy for cure of idiopathic dilatation of the common duct; the patient died of peritonitis. Sprengel in 1891 is credited with the first cure for this condition.

So many contributions have been made to surgery of the gallbladder that only a few of the more outstanding pioneers can be mentioned in this thesis. No paper would be complete without the names of Courvoisier and Thiriar of France, and Ohage of our own country.

In attempting to evaluate our results in gallbladder surgery, I believe it is as difficult as finding out a man's real character, but I have been told on good authority that the quickest manner to secure reliable information is to go to his neighbors, and this gave me the idea of searching the literature for our medical confreres' opinions of the results following gallbladder operations. Our medical colleagues state that 41.5 per cent of individuals who have had operations upon the biliary tract come back after from one to thirteen operations, still complaining of symptoms of gallbladder disease or so-called biliousness.

I was rather astonished to learn that so large a percentage should return with symptoms of cholecystic disease after some form of gallbladder surgery, and, therefore, decided to investigate a series of our own cases. I selected a five-year period, 1921 to 1926. During these five years 651 patients were operated upon at Fairview Hospital for cholecystic disease, including all varieties of inflammation from mild catarrhal to gangrene. In this series there were fifty-nine deaths, or a hospital mortality of 8.9 per cent. I sent questionnaires to the surviving 592 patients, asking the following questions:

1. Are you entirely well from the symptoms for which you sought relief?
2. If you are not entirely well, has your general health improved?
3. Give any other information relative to your case that you think important.

Three hundred and twenty-seven patients answered the questionnaire; not a very large number on which to base conclusions, but let us take them for what they are worth.

Of the 327 patients who answered the questionnaire, 197 (about 60 per cent) had cholecystectomies, and 130 (about 40 per cent) cholecystostomies. In the 197 cases of cholecystectomies, there were 130 cases of cholecystitis without stones (about 60 per cent), and sixty-seven cases of cholecystitis with stones (about 40 per cent). Of the 130 patients diagnosed cholecystitis without stones, sixty-eight (53 per cent) stated they were cured. Sixty (47 per cent) were not entirely relieved of their symptoms. One hundred and six (81.5 per cent) of the 130 patients stated they were improved by the operation. None of the 130 cases has had operations elsewhere since leaving the hospital. Of the sixty-seven patients undergoing cholecystectomies for cholecystitis with stones, fifty-six (83 per cent) stated they were cured. Eleven patients (17 per cent) stated they were not entirely relieved. Sixty-three (94.2 per cent) stated their general health had improved. Only four (5.8 per cent) stated they had received no benefit from the operation. One patient in this series has died since leaving the hospital. Two have had operations elsewhere for symptoms similar to those for which they sought relief.

In our series of 197 cases of cholecystectomies, the incidence of cure was 31 per cent greater when the cholecystic disease was associated with stones. In our series of 327 patients who answered the questionnaires, 130 cases were cholecystostomies. Fifty-two per cent of these stated they were entirely relieved of the symptoms for which they sought relief; the other 48 per cent had such a multiplicity of complaints that no attempt will be made to discuss them here, and they must be recorded as failures as far as cure is concerned.

To summarize these statistics, it will be seen that in cholecystectomies for cholecystitis with stones the results are very favorable—83 per cent cured—while in cholecystectomy for cholecystitis without stones only 52 per cent were cured. The average percentage of cure in our series of cholecystectomies was 67.64 per cent. This leaves 32.36 per cent who will no doubt seek relief for biliary symptoms elsewhere. If we now include our series of cholecystostomies, with only 62 per cent stating they were cured and 48 per cent not relieved of their symptoms, the grand total that will visit the practitioner for relief of biliousness will be about 40 per cent. This checks quite closely with Dr. Smithie's statements that 41.5 per cent of individuals having had operations upon the biliary tract come back to the practitioner after multiple operations on the biliary tract, still complaining of their original syndrome.

---

*Inaugural Thesis.

To understand and treat this common condition effectively is, therefore, a matter of great practical importance. When we consider the multiplicity of duties performed by the liver and the fact that these functions may be relatively or equally involved in the presence of hepatic disease, is it any wonder that so large a percentage come into our practice after from one to thirteen operations, still complaining of biliousness? Were it not for the enormous functional reserve and regenerative power of the liver, our failures would be still greater. It is a well known fact that hepatic tissue may be permanently reduced to as low as 15 per cent of the normal amount without pronounced impairment of liver functional efficiency if a proper dietary régime is maintained. This explains the frequent failure to demonstrate functional impairment even in the presence of advanced anatomical changes primary in the liver or secondary to lesions in the extra-hepatic biliary passages, and is the reason for the inefficiency of tests such as the Van den Berg and others. It is essential to know and consider not only the more important functions of the liver and the bile passages, but also the etiology and pathology of the entire gland and its ducts, in order to determine the best treatment and surgical procedure that will give us the greatest percentage of cures.

In this paper the functions will not be discussed, but the paper would be incomplete without mentioning the important ones.

The part played in carbohydrate metabolism by the liver is chiefly: (1) the maintenance of normal glucose concentration of the blood; (2) the removal of glucose from the circulation in its passage from the intestine. In the protein metabolism its chief function is deamination of amino-acids, urea formation, and the formation of fibrinogen. In fat and lipoid metabolism it is necessary to have an adequate supply of bile salts in the small intestine to obtain satisfactory saponification and absorption. But little is known of cholesterol metabolism. However, it has been demonstrated that the liver contains an enzyme (esterase) which is capable of splitting cholesterol esters (the reversible reaction of synthesis of cholesterol ester from fatty acids and free cholesterol and of hydrolysis, by means of esterase) into free cholesterol and fatty acids, a process probably occurring constantly in the liver. In addition, it is well known that the liver is the channel of elimination of cholesterol, which is excreted in the free state in the bile.

Another very important function of the liver is that of a detoxifying agent. In this it is believed to play an important part in protecting the organism from various toxic substances entering through the intestinal tract. This detoxifying function is believed to involve processes of oxidation and conjugation into relatively non-toxic substances which are subsequently eliminated in the bile and urine. For example, indol absorbed from the intestine reaches the liver through the portal system, is oxidized into indoxyl, conjugated with sulphuric acid and eliminated in the urine as indoxyl sulphuric acid.

The liver also differs from other glands in that it receives a supply of blood from arterial and venous sources, and that the greater supply is venous, coming from the organs drained by the portal system. This intricate circulatory mechanism suggests that a significant function of the liver is an exchange of substances carried to the organ by the blood and that the liver anatomically and physiologically is composed of two organs, namely, the parenchymal cells of the liver and the reticulo-endothelial cells similar to those found in the spleen and bone marrow.

The pathological changes are more interesting from the standpoint of the surgeon, and the most outstanding features of disease in the biliary system is the tendency to the formation of gallstones. The complete chain of events underlying the primary formation of these calculi is not yet completely understood. We do, however, understand the paramount significance of the underlying pathological changes in the biliary system, of which stone is only one result.

We know that millions of bacteria enter the biliary system from the intestinal tract and come in contact with cholesterin, calcium, salts and bile pigments and that most stones are of this combination type. This combination type of stone would lead one to believe that infection is not the sole cause of gallstones, but that lipoid deposits, which are deposits of esters of cholesterin, form in masses of endothelial cells in the tips of villi of the mucosa of the gallbladder. This is a disturbed cholesterin metabolism which gives rise to the so-called strawberry gallbladder. There are, then, three important factors in the formation of gallstones: (1) infection; (2) metabolic disturbances; (3) stasis of bile.

The principal factor in surgical diseases of the biliary tract is without doubt some form of bacterial infection. The exceptions are neoplastic conditions. The main avenues of infection are: (a) direct extension through the common duct; (b) hematogenous, through the portal system and hepatic artery; and (c) through the lymphatic system. The normal bactericidal action of the liver cells is sufficient to overcome and destroy most of the germs carried to them. A lowered resistance of these cells either through disease or overwork may allow some of the organisms to escape destruction and be excreted with the bile. When the detoxifying function is incomplete and the bacteria escape destruction, then the hepatic cells become infected. This is the primary focus or source of infection in most cholecystic inflammation, and it is from this source through the lymphatic system that the gallbladder wall becomes infected. This at once establishes the possibility of a vicious circle through the lymphatic system from hepatic cells to gallbladder walls, and vice versa. And this formulates the rationale of cholecystectomy, because the vicious circle is broken and a considerable part of the infected tissue removed. This, it seems to me, also accounts for the failure of gallbladder surgery to cure all cases, for bacteria are still carried to the liver and we have no guarantee that the detoxifying function of hepatic cells is any more perfect after cholecystectomy than before. Therein also lies the possibility that, once we have cholecystic disease and possibly after removal by surgery, there is unchecked decomposition of chyme with liberation of skatel, indol, and a number of toxic alkaloids which are not completely detoxified and, therefore, are the underlying causes of biliousness following many gallbladder operations.

With our present knowledge of the liver and its underlying etiological factors in biliary diseases, it does not appear that gallbladder surgical procedures alone will ever result in 100 per cent cures. However, to date, surgery offers the finest results obtainable by all forms of treatment.

After proper diagnosis has been established, the most important consideration is the choosing of the correct operative procedure. It will be remembered from our statistics that cholecystectomy for cholecystitis with stones gave us the most favorable results, the incidence of cures being 83 per cent, and 94.2 per cent of the patients having their general health improved. On the other hand, the patients upon whom a cholecystectomy was performed for cholecystitis with no stone present were cured in only 52.3 per cent, and 81.5 per cent had their general health improved. The average percentage of cures in cholecystectomies in our series then is 67.8 per cent, and the average percentage that had their general health improved but not entirely cured by operation, was 87.8 per cent.

In our series of cholecystostomies, only 52 per cent were cured. The other 48 per cent were not benefited at all by the operation. This shows definitely that cholecystectomy should be the operation of choice wherever feasible, and this is especially true when stones are associated with the cholecystitis. Cholecystectomy is the most desirable procedure although cholecystostomy may at times be an operation of necessity.

There is considerable difference of opinion as to when cholecystectomy is indicated or cholecystostomy advisable. It is my opinion that cholecystectomy can be done in practically all cases if the proper time is selected; in general, it should be done in all chronic cases, all gangrenous cases and in most empyemas of the gallbladder. Conditions under which we should usually limit operation to cholecystostomy are, the acute diffuse infection of the gallbladder involving the ducts sometimes found in exploring an acute abdomen, and also where it is necessary to preserve the gallbladder to divert the flow of bile into stomach or colon.

The difficulties and dangers of removing the acutely inflamed gallbladder when the ducts are involved are too well known to discuss here. Some surgeons still hesitate to remove a gangrenous gallbladder. I do not feel there is any justification for this fear. In gangrene the circulation is shut off and there is practically no danger from this source; and if one fears oozing from the liver surface, the gallbladder may be excised with a radio knife along the hepato-cholecystic margin, thus leaving that part of the gallbladder attached to the liver. By this procedure the major source of the infection can be removed and no raw surface is left to bleed and form adhesions.

The question of drainage in gallbladder surgery is an important one. In general, I will state that drainage should be omitted where the field is aseptic and dry. In all infected cases with active inflammation, drainage should be used. Where the infection involves the biliary ducts, I believe in drainage through the cystic duct and a secondary tube down to the base of the cystic stump. Only very rarely is it necessary to incise the common and hepatic ducts and use a T-tube. I use a T-tube in strictures of the common duct and where large stones are impacted in the duct.

I am going to report a few cases which were unusual and which taught me lessons that have been of value:

Case 1.—Miss F. K. was admitted to Fairview Hospital July 26, 1930, with a definite gallbladder history of four years. Her temperature just before operation was 106°, she was deeply jaundiced, vomiting, and presented a definitely acute abdomen. Procrastination seemed to me out of the question and there was no time to hesitate, for a life was surely at stake. An immediate laparotomy was done and the specimen which I here present was removed. It was an acute gangrenous gallbladder with pus and stones present. After the intestine had been well packed off, the gallbladder fundus was seized with a piece of gauze and a slight traction on it pulled it off from its liver attachment almost to the cystic duct. The balance of the dissection was completed by the fingers. The cystic stump was ligated and a piece of iodoform gauze packed into the liver bed to check oozing from the liver surface. After two stormy days the patient made an uneventful recovery and the jaundice cleared up as quickly as it frequently does with drainage of the cystic duct.

Case 2.—Mrs. M. S. was admitted to the Fairview Hospital December 13, 1932, moderately jaundiced and with an extremely acute abdomen with most tenderness in the right upper quadrant. A laparotomy was done December 14 and an enormously enlarged gallbladder presented itself, together with a marked bulging on the upper surface of the right lobe of the liver. A trocar was inserted into the bulging mass and pus poured out. Here we had a very diffuse inflammation of the gallbladder and ducts with perforation into the right lobe of the liver. A cholecystotomy was done and she made an uneventful recovery. However, about four months later she returned with symptoms of gallstones. A cholecystectomy was done and at this time a stone was found that was evidently overlooked at the first operation.

Case 3.—Mrs. H. M. was admitted to the Fairview Hospital March 16, 1931, with a history of appendectomy the previous year without relief. She had a typical history of gallstones. Cholecystectomy was done for early gangrene of the gallbladder complicated by a large stone in the cystic duct. On the third postoperative day she began to drain bile, and this continued for some six weeks. She felt well for about eight months, when she began to get attacks of indigestion, became deeply jaundiced, but complained of no particular pain. On January 27, 1932, nine months after her first operation, she was readmitted to the Fairview Hospital complaining of weakness and exhaustion. She was deeply jaundiced but stated she had no pain. A tentative diagnosis of malignancy was made, or probable stone in the common duct. A laparotomy was done on January 29, 1932. Some adhesions were encountered, but were easily liberated. No stones or tumors could be palpated, but there was complete obstruction (due to an atresia) of the common duct at a point where the cystic duct entered it. The stricture was resected and an end-to-end anatomosis was made with a few interrupted sutures, and a T-tube was left in the common duct for eleven months. She made an uneventful recovery.

Case 4.—Mrs. M. S. was admitted to Fairview Hospital December 18, 1933, with a history of three previous cholecystostomies during the past twelve years and external bile fistulæ following all the operations. She had been told by the previous surgeons that cholecystectomy could not be done safely in her case. When she came to us there was an acute exacerbation of her old condition. She was quite deeply jaundiced. Aside from that, her condition was fairly good. A cholecystectomy was done and the cystic duct drained. She made an uneventful recovery and the fistulæ have remained closed.

The chief reason for reporting these cases is to show that hard and fast rules cannot be laid down for gallbladder surgery and that no prolonged preliminary treatment is always necessary for jaundiced cases. In fact, I do not believe that calcium is of any special value in preventing hemorrhage, if there is a hemorrhagic tendency. A transfusion is more efficient and supports the patient much better.

I have arrived at the following conclusions from the study of the cases reported in this paper:

1. Definite disease must be present in the gallbladder before cholecystectomy is advised or performed.
2. After cholecystectomy, all raw surfaces must be carefully covered, preferably with peritoneum.
3. The anesthesia must be administered so that the patient is completely relaxed. In no other way can surgical trauma be eliminated, and efficient work done.
4. Cholecystectomy can be done early even in the presence of jaundice, for delay only extends the involvement and adds to the morbidity and mortality.
5. Cholecystostomy is an operation of necessity at times, but should never be one of choice if cholecystectomy can be done.
6. Cholecystectomy is the operation of choice except in the acutely diffuse cholecystitis with involvement of the biliary ducts or when it is necessary to use the gallbladder as a channel to divert the flow of bile.

Discussion

Dr. Ivar Sivertsen: I wish to congratulate the essayist on his courage, and also on the subject matter that he presents. It is interesting to have him bring to us the records of one institution, and while we cannot be very proud of the fact that this institution had an 8.9 per cent mortality in gallbaldder surgery, we must remember that this includes all surgeons working in the hospital.

There is one thing I should have desired the essayist to have reported: which type of gallbladder surgery showed this mortality, cholecystectomy or cholecystostomy? I believe there are cases of gallbladder disease where it is better to drain than remove the gallbladder. I fully realize that the better surgeons are removing the gallbladder in every case of gallbladder disease with which they come in contact. I understand that Dr. Arnold Schwyzer removes practically 99.9 per cent of his gallbladders, regardless of what condition they are in.

The question of 40 per cent recurrence of symptoms after cholecystectomy seems rather high. I know that in my own work I have not had these patients return, with symptoms, to the extent of 40 per cent, nor do I think that 40 per cent of gallbladder cases have been simply drained. His further statement that 60 per cent of the cases with no stones showed a recurrence of symptoms and that these cases no doubt would have been better off if they had not been operated upon would not agree with my own experience.

In the true gallbladder disease, with stones, that is the acute gallbladder, 83 per cent represents approximately the cure in our cases, and this, too, I think is about the same percentage as we find throughout the country. I do not think we can hope to have a 100 per cent cure in gallbladder disease.

The question of drainage is always interesting. We know there are accessory ducts to the gallbladder, and if these are missed, notwithstanding the fact that we tie the cystic duct and bleeding has been checked, there will be drainage of bile into the peritoneal cavity, and therefore it is always wise to put in a small cigarette drain. I can see no objection to such a drain. It causes no more liability to hernia or infection. I have therefore closed up but one case without a drain, and this I did to my sorrow; I later had to introduce drainage.

Dr. Thorvald Petersen: I cannot give the exact mortality in the two operations. The deaths were greater following cholecystectomy.

In regard to the mortality in the series of cases that I reported, I will state that it compares very favorably with that of other groups reported when cases are not selected but taken at random.

The mortality may be reduced by more careful preoperative preparation. However, no prolonged treatment is needed; often two or three days are sufficient even in serious cases. Glucose, hypodermoclysis and transfusions are the principal agents of value.

In the past two years the mortality in gallbladder surgery has been slightly under 3 per cent and I think that is quite universal in our institution.

So far as drainage is concerned, I think there is an objection to anything foreign in the abdominal cavity, but when the field is aseptic and dry the abdomen may be closed without drainage.

Dr. O. H. Wangensteen (University of Minnesota) made a very interesting report upon the meeting of the merican Surgical Association, which was held June , 5, and 6, 1934, at Toronto, Ont., Canada.

REPORT OF THREE CASES OF DIABETIC GANGRENE

Willard C. Peterson, M.D.

In presenting these cases tonight my purpose is not to present anything new or startling but to refresh our memories of what can be done with cases of diabetic gangrene.

All of us know that practically all diabetics have some degree of arteriosclerosis and since the work of Petrain and of Newburgh and Marsh, who first advocated the high fat diets to make up the caloric intake, the incidence of arterial disease has increased.

In a presentation of this type time will not permit going into all the details of the treatment but I should like to mention certain essentials. These can be grouped under two headings.

Prophylaxis.—As soon as a diagnosis of diabetes is made the patient should be warned of the danger of injury to the feet, from bruising, too tight shoes, or nails in the soles or heels of shoes. The paring of calluses is a particular source of danger. The patient should be instructed in the care of the feet as to cleanliness, prevention or treatment of epidermophytosis, the wearing of soft stockings and protection against cold. Of importance also is the warning against excessive standing or walking.

Checking the twenty-four hour urine samples for sugar and keeping the patient sugar-free are factors both in prophylaxis and treatment.

Treatment.—For trophic disturbances we have used warm moist boric packs rather than dry heat because of the danger of too much and uncontrolled heat. Many diabetics have had their ulcers or gangrenous areas aggravated by the application of excessive heat.

Elevation of the foot is important and deviation from this consists of Buerger's exercises ten to fifteen times two to three times daily.

Careful removal of necrotic material does much to hasten healing. No tissue with circulation should ever be cut into, nor should any incision extend beyond the dead areas, as these fresh edges will then become necrotic and the area merely increased in size. Treatment with mild ointments sometimes is useful when the patient becomes tired of the packs but should be used only for a short time.

In the diet as large an amount of carbohydrate as possible has been used and controlled by insulin. We have found that even though these patients have been able to get along on adequate amounts of carbohydrate without the use of insulin, their ulcers heal better if the carbohydrate is increased and the excess controlled by insulin.

Five grains each of theobromine and sodium bicarbonate three times a day have been used in an attempt to increase peripheral circulation.

Presentation of Three Patients

The first patient is a man, fifty-two years of age. His diabetes was first diagnosed about ten years ago. Two years later, or in December, 1926, he developed gangrene of the ends of both big toes. Under diet and insulin and the use of mild packs with elevation, these areas healed with only small amounts of sloughing.

July 20, 1927, he developed an ulcerative condition under the base of the fifth metatarsal bone of the left foot. The urine at this time again showed the presence of sugar. His diet was readjusted and insulin used to clear the sugar. This area continued to drain and on September 22 he developed a deep abscess on the lateral side of the foot. This was treated by warm packs but continued to increase and two days later was incised and drained at the hospital, where he was treated for two weeks more and then sent home for further care.

October 28, 1927, another area of redness and swelling developed on the dorsum of the foot which was treated in the same manner. These areas were all healed by January 4, 1928, five and one-half months after the onset of the most severe symptoms. He continued reasonably well until June 6, 1929, when he again developed a gangrenous area at the base of the small toe and a few days later an area of redness and swelling appeared above it which required incision and drainage. Sugar was again present in the urine. By the end of three months all the areas were healed and have remained so since.

This case represents that of a man actively engaged in business with the constant menace of gangrene whenever he becomes careless in his diet. The temptation of food desire has been extremely great but he apparently realizes the danger now and is more tractable. He is fortunate in having a warning that he is on the danger line in the form of diabetic neuritis which clears up as soon as he is again sugar-free.

The second case is that of a married woman, aged fifty-nine, who was diagnosed as diabetic twelve years ago. On November 14, 1929, she injured the right small toe while trimming a callus. The toe developed pain, tenderness and redness with a watery discharge. On November 21, 1929, she was admitted to the hospital with a gangrenous area extending from the right small toe up onto the dorsum of the foot. The skin was discolored a deep purple and the area was extremely painful.

The entire area was cleansed and warm boric packs applied with the leg in an elevated position. Sugar was present in the urine but with diet and insulin she became sugar-free in approximately four days. On November 24, 1929, there were areas of sloughing tissue. Four days later small sloughs were dissected out, and by December 2 granulation tissue was appearing. However, two days later a gangrenous area appeared on the ball of the right foot. The following day the purple discoloration had spread up to the ankle joint and the entire sole was very painful. After four days, or on December 8, the dorsum of the foot showed improvement but the process in the sole of the foot became more active.

On December 12 and 16 areas of the plantar fascia and the flexor tendon of the right small toe were removed. After this the condition steadily improved and she was allowed to go home on February 2, 1929, with healthy granulating areas on the sole of the foot. These were completely healed two months later.

This case shows what can be done even in massive gangrene without amputation. Her only residuum now is an over-extension of the right fifth toe and slight stiffness and narrowing of the sole of the foot from cicatricial contraction.

The third case is that of a married woman, aged sixty-one, in whom a diagnosis of diabetes was made in 1929. At that time she had pains in her feet and legs and a diagnosis of arteriosclerosis as well was made. On January 22, 1932, she developed a severe cardiac decompensation following an attack of influenza, from which she recovered after a period of rest in bed.

On September 26, 1932, she developed an infection of the right big toe which in turn developed into a gangrenous ulcer, and did not heal until three months later.

During the summer of 1933 she developed an ulcer of the right heel and decided to go away for treatment. After a stay of six weeks she returned. At this time the ulcer measured 1.5 by 1 inch and was quite deep. The edges were necrotic and no attempt at healing seemed apparent. She was put to bed and the diet adjusted with insulin to make her sugar-free. Warm boric acid packs were applied to the elevated foot and small necrotic bits were removed from the ulcer. Buerger's exercises were used daily.

After about six weeks of treatment small granulating areas were observed on the medial side but the lateral aspect continued to slough and the subcutaneous tissues were undermined. Small areas of necrotic material were removed from time to time. Occasionally Lanolin ointment was used for a few days as a relief from the warm packs and finally on August 7, 1934, the ulcer was completely healed.

This case shows what patience and coöperation of the patient will do for an extremely obstinate type of lesion. No doubt the delay was influenced greatly by the presence of the severe arteriosclerosis.

In conclusion, I feel that I have shown to some degree what can be done for these patients using conservative and simple methods of treatment. Amputations can always be done but if we can give these unfortunates even a moderately impaired foot they are far better able to pursue a normal life than if they had to resort to artificial appliances.

Discussion

Dr. Ivar Sivertsen: I would just dare suggest a trick I have followed in the treatment of calluses: I simply take a piece of fine sandpaper, and place it on a block of wood and use it as a file, filing down the callus. This will not injure the skin and consequently will prevent any chance of infection or gangrene.

HYPERPARATHYROIDISM

R. C. Webb, M.D.

Summary of Presentation

Hyperparathyroidism is due to a hypertrophy of one or more of the parathyroid glands. Generalized osteitis fibrosa cystica results from this condition and renal calculi may result.

The case report of a patient with this condition was presented together with the parathyroid tumor and x-rays of the skeleton. The patient was a young woman of twenty years with symptoms of three years duration. Her maternal grandfather and her mother may have had hyperparathyroidism. She had had gastrointestinal disturbances, polyuria, polydipsia and general weakness during this period followed by fracture of both femurs January 1, 1934. The neck was explored January 10, 1934, and a parathyroid tumor found and removed. The patient was treated for her fractured femurs and made a good recovery. The areas of bone absorption and destruction elsewhere in her skeleton were shown to be steadily undergoing restoration and repair.

F. A. Olson, *Secretary.*

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for February

The Minnesota State Medical Association Morning Health Service

The Minnesota State Medical Association broadcasts weekly at 10:30 o'clock every Tuesday morning over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month will be as follows:

February 5—Some Heart Facts.
February 12—Pernicious Anemia.
February 19—Hives.
February 26—Mouth Health and General Health.

American Congress of Physical Therapy

The American Congress of Physical Therapy announces a one-day session of its Mid-Western Section to be held in the Auditorium of the Service Memorial Institute, Madison, Wisconsin, Tuesday, March 12, 1935.

The morning session will be devoted to hospital clinics and the afternoon session to scientific papers. The evening program will be conducted under the auspices of the section and the Dane County Medical School.

The program may be obtained by writing to Marion G. Smith, Executive Secretary, American Congress of Physical Therapy, 30 North Michigan Avenue, Chicago, Illinois.

College of Surgeons Sectional Meeting

A sectional meeting of the American College of Surgeons, embracing Manitoba, Wisconsin, North Dakota, South Dakota, and Minnesota is to be held in Saint Paul, March 15, 16 and 17, 1935.

On the program will be men of national reputation, some coming from long distances. Clinics will be given in the mornings and scientific papers and movies in the afternoons and evenings. The entire program is open to all members in good standing of county medical societies and all state and provincial districts.

We desire to emphasize especially a welcome to all medical men to attend the program whether they are members of the College or not.

George Earl, *Chairman,*
Local Arrangements Committee.

Clarence Martin Jackson Lectureship

The second annual address in the Clarence Martin Jackson Lectureship, sponsored by Xi Chapter of Phi Beta Pi Medical Fraternity at the University of Minnesota, will be given by Dr. Logan Clendening, Professor of Clinical Medicine at the University of Kansas. His subject will be "The Human Side of Medicine."

Dr. Clendening is well known for his writings, both technical and popular, on medical subjects, as well as for his ability as a speaker. Some of his better known books are *Methods of Treatment, Behind the Doctor,* and *The Human Body*.

The address last year was given by Dr. Walter L. Bierring, president of the American Medical Association, who spoke on the subject "Historical Sequence of Medical Events."

This year's address will be given in Northrop Memorial Auditorium on the campus of the University of Minnesota at 8:15 P. M., Friday, March 8, 1935.

The general public, as well as the profession, are cordially invited to attend.

Mayo Foundation Lectures

A special program of lectures and demonstrations in medicine will be held under the direction of The Mayo Foundation from March 4 to 8, inclusive. Mornings will be devoted to medical and surgical clinics. In the afternoons and evenings symposiums will be conducted on urology, acute abdominal conditions, pediatrics, gastro-enterology, the thyroid and parathyroid glands, and dermatology. In addition, two clinico-pathologic conferences will be held. On Friday evening, March 8, the Minnesota Trudeau Society will hold an open meeting.

While these programs are arranged primarily for the Fellows of the Foundation, visiting physicians are invited to attend.

Interchange Lectures at Rochester

Lectures by members of the Faculty of the Medical School at the Mayo Foundation, Plummer, Hall, 7:30 P. M.

February 14
*Dr. Henry E. Hartig
Title: "Sound and Hearing"

February 28
Dr. Irvine McQuarrie
Title: "Effects of Certain Salts in the Diet on Blood Pressure and Carbohydrate Metabolism"

March 14
Dr. Morris Nathanson
Title: "Observations Relative to Cardiac Syncope and Sudden Cardiac Death"

March 28
†Dr. John T. Tate
Title: "Transmutation of the Elements"

April 11
Dr. Henry E. Michelson
Title: "Tuberculosis of the Skin"

Minnesota Radiological Society

The fall meeting of the Minnesota Radiological Society was held at Rochester, Minnesota, October 13, 1934. The program was presented by the staff of the Mayo Clinic and was as follows:

1. Xanthomatosis—Clinical Aspects.................. Dr. R. L. J. Kennedy
   Roentgenologic Aspects.............. Dr. J. D. Camp
2. Backache ....Dr. R. K. Ghormley
3. Interesting Diagnostic Problems......Dr. J. D. Coate
4. Mortality Studies on Carcinoma of the Cervix Dr. R. E. Fricke
5. The Duodenal Niche.........................Dr. H. A. Burch
6. Osteopoikilosis and Allied Diseases of Bone Dr. C. G. Sutherland
7. Limits of Safety in Roentgenography.................. Dr. A. Turnbull
8. The International Congress of Radiology at Zurich and St. Moritz...............Dr. A. U. Desjardins

ADDRESS

Some Effects of Radiation.........................Dr. C. Sheard

Leo G. Rigler, M.D., *Secretary.*

Union Hospital Staff Meeting

The staff members of the Union Hospital, New Ulm, met January 8, 1935. The following new officers were installed: Dr. O. J. Seifert, president; Dr. G. Reinecke, vice president; Dr. C. A. Saffert, secretary. Illustrated addresses were given on Abdominal Viscera, Colles' Fractures, and Emergency Operations on Liver and Bladder.

Staff meetings are to be held monthly.

WOMAN'S AUXILIARY

President—Mrs. Martin Nordland, Minneapolis
Editor—Mrs. C. F. Ewing, Wheaton

Ramsey County

The first meeting of the Ramsey County Medical Auxiliary was held at the home of Mrs. Frank E. Burch on Monday, October 29, 1934. Mrs. Nordland, the state president, was there and spoke very pleasantly, but briefly, after the business meeting. The program of the afternoon, arranged by Mrs. J. T. Christison, was an exceedingly pleasing one. Mrs. Adolph Ahrens sang a group of songs, and Mrs. Edgar Russell played a number of violin selections; both were accompanied by Mrs. W. R. Raudenbush. This was followed by a social hour and tea, at which more than ninety members were present.

About seventy members attended the second meeting on November 26, 1934, held at the home of Mrs. F. J. Savage. After a brief business meeting, Mrs. Christison presented Miss Helen Austin, who read the play, "Yellow Jack." It was a most interesting occasion, and the enjoyment continued with the discussion of the play during the tea hour.

---

*Dr. Hartig is Associate Professor of Electrical Engineering.
†Dr. Tate is Director of the University College and Professor of Physics.

It was decided by the Ways and Means Committee, under the chairmanship of Mrs. F. J. Plondke, to hold a series of chain luncheons, starting with eight women, each of whom would contribute fifteen cents to the luncheon she attended and then each would, in turn, invite seven women to luncheon, until all the members had given or attended one. This seemed an easy way to make money, as well as a very pleasant way to make social contacts between the members. There are twenty-seven new members this year.

The Board members were entertained at one of these luncheons, January 21, at the Woman's City Club, with Mrs. C. N. McCloud and Mrs. C. F. Ewing as hostesses. The regular Board meeting followed.

* * *

West Central Minnesota

The West Central Medical Auxiliary met the doctors for dinner at the Merchants' Hotel in Morris, Minn., January 9, at which time they decided to place *Hygeia* in schools and libraries in the district that are without it.

There will be no more meetings until April.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

Practical Endocrinology. Symptoms and Treatment. Max A. Goldzieher, M.D. Endocrinologist, Gouverneur Hospital, etc. 326 pages. Illus. Price, cloth, $5.00. New York: D. Appleton-Century Co., Inc., 1935.

Summary of the Treatment of Fractures and Dislocations. R. Broomhead, F.R.C.S. Surgeon, Orthopedic Department, General Infirmary at Leeds, etc. 30 pages. Price, paper cover, 3/6d. Leeds, England: Jowett & Sowry, Ltd., 1934.

Observations of a General Practitioner. William N. Macartney, M.D. 478 pages. Boston: Richard G. Badger, The Gorham Press, 1932.

Standard Classified Nomenclature of Disease. Compiled by National Conference on Nomenclature of Disease. Edited by H. B. Logie, M.D., C.M., Executive Secretary. 870 pages. Price, cloth or flexible binding, $3.50. New York: The Commonwealth Fund, 1935.

Annual Report of the Surgeon General of the Public Health Service of the United States. 142 pages. Price, cloth, 75c. Washington, D. C.: U. S. Government Printing Office, 1934.

Proceedings of the Twenty-eighth Annual Convention of the Association of Life Insurance Presidents. 240 pages. New York: Assn. of Life Insurance Presidents, 1934.

SPINAL ANESTHESIA, TECHNIC AND CLINICAL APPLICATION. George R. Vehrs, M.D. 269 pages. Illus. $5.50. St. Louis: C. V. Mosby Co., 1934.

The rapid increase in the use of spinal anesthesia for subdiaphragmatic surgery is well justified, in Vehrs' experience. In a compact and readable monograph, he covers the subject completely. The anatomy and physiology of the spinal canal and of the cerebrospinal fluid are discussed, and the effect of the addition of soluble anesthetics to the spinal fluid, upon the heart and respiration, are adequately described. The indications and contraindications for, and the complications of, spinal anesthesia are competently discussed. Vehrs states that the mortality rate due to spinal anesthesia is from .007 to .01 per cent, which seems to justify his statement that spinal analgesia is, in proper hands, safer than other types of anesthesia. He confidently believes that total spinal analgesia, under the hands of experienced operators, will prove very valuable in selected cases. Explicit information regarding technic is included.

Thomas Myers, M.D.

DR. COLWELL'S DAILY LOG FOR PHYSICIANS. Colwell Publishing Company, Champaign, Illinois, 1934. Price, $6.00.

The volume consists of a day book, an entire page with room for thirty-six entries being devoted to each day of the year. Columns are provided for charge accounts, cash received on account items, and for ledger entry checking.

At the end of each month a page is devoted to a summary of the month's professional business. Two more pages are devoted to the various professional expense items, particularly useful in filling out income tax reports. Further space is provided for a record of non-professional receipts and disbursements, narcotics dispensed, appointments and surgical record.

While most physicians have their own systems of keeping record of these items which seem to suit their particular type of practice, we can recommend Dr. Colwell's Daily Log as one easy method of recording items necessary in present-day practice.

Hospitalization of the Mentally Ill

Members of the House of Delegates and others have been solicited by Dr. John M. Grimes to purchase a book that he has printed purporting to contain the results of the study recently made by the Council on Medical Education and Hospitals of the hospitalization of the mentally ill in the United States. Such individual use of the Council's material is, of course, wholly unauthorized. A report prepared by Dr. Grimes when he was employed by the Association was not published because in the opinion of the Council and an advisory committee of psychiatrists and neurologists his conclusions were not supported by the evidence presented. Two partial reports that have already been published will be supplemented when further studies have been completed.—*Jour. A. M. A.*, Nov. 10, 1934.

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society.

Volume 18 MARCH, 1935 Number 3

TEN YEARS OF SURGERY FOR CANCER OF THE BREAST*

W. A. COVENTRY, M.D., F.A.C.S., and RUSSELL J. MOE, M.D.

Duluth

CANCER of the breast, its treatment, and the end-results of treatment have always been of intense interest to us. One may judge from the numerous articles appearing in our medical literature that there has been aroused an interest among radiologists as well as surgeons, both apparently striving for some method of increasing longevity.

In view of the fact that the great majority of statistical studies of carcinoma of the breast have emanated from large surgical or cancer centers, we have conducted a study to determine the results in cases treated surgically in the city of Duluth, the population of which is approximately 100,000.

The radical operation advocated by Halsted and Willy Meyer in 1888 was for many years the only method of attack against this dread disease. It is still the most effective weapon in the hands of the surgeon today. In recent years x-ray therapy, either preoperatively or postoperatively, or both, has been advocated as an adjunct to radical surgery; and still more recently radium emanations have been used.

Inadequate histories and postoperative follow-up plus the lack of a competent pathologist to study the microscopic sections prevented us from reporting results of operations prior to 1919. This report is based on 186 cases of carcinoma of the breast treated according to the choice of twenty-six different surgeons between the period of 1919 to September 1933. We fully appreciate the fact that recent cases are of no value in determining end-results, but they are here included for other statistical data.

TABLE I. DISTRIBUTION OF CASES ACCORDING TO SURGEONS

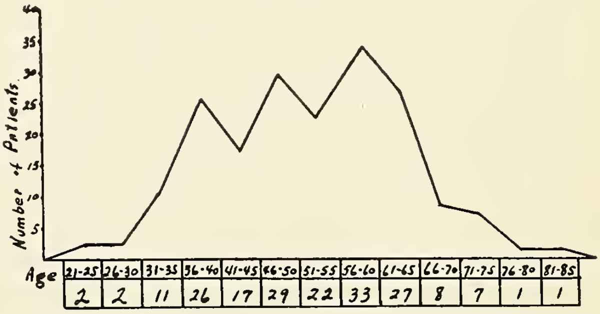
1 had 48 cases
1 had 32 cases
1 had 26 cases
1 had 12 cases
1 had 9 cases
1 had 8 cases
2 had 7 cases each
1 had 5 cases
3 had 4 cases each
2 had 3 cases each
1 had 2 cases
12 had 1 case each

One may conclude that 63 per cent of the patients were operated upon by experienced surgeons and 37 per cent by the occasional surgeon.

Age Distribution

The age distribution, as seen in Chart I, shows that the average age was fifty-one years and the highest incidence in the five-year period between fifty-six and sixty years. This is in accord with the other published statistics. It is of interest to note that 22 per cent of the cases occurred at or before the age of forty.

CHART I.



There were two males in this series, giving a percentage of 1.07 per cent as compared to 1.24 per cent as reported by Pack in his series. One of our two males was thirty-six years of age and the other sixty-one. Of the 184 females, 166 were married and eighteen unmarried.

---

*From The Duluth Clinic. Read at the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

The symptoms of carcinoma of the breast play a minor role in making the diagnosis. Many conditions may simulate cancer, particularly in the early stages. Pain, fixation and so forth are late evidences of disease. The early case and the one which carries the most favorable prognosis can be accurately diagnosed only by biopsy. The predominating symptom of course is "a lump in the breast," and every woman who presents herself with this "lump" is entitled to and should have a biopsy to determine whether or not malignancy is present. If no malignancy is found by thorough gross and microscopic examination, the patient's fears may be relieved. However, when the presence of cancer is proved by biopsy, regardless of the size of the growth, a radical amputation should be insisted upon.

In our series the average duration of symptoms before operation was 11.2 months. This time interval should be materially reduced if we are to improve the end-results of the disease. This, of course, can only be accomplished by periodic examinations and cancer education.

Metastasis

In 121 of the 186 cases, metastases were found to be present by microscopic examination of the axillary or supraclavicular glands removed at the time of operation. In only seventy of these cases were definite glands palpable before operation, proving that metastasis may already have occurred, although the nodes are not palpable. We find that the average length of life in those patients who had palpable glands before operation was two and one-half years, while those who had no palpable glands preoperatively lived on an average of five and one-half years, a very strong link in the chain of evidence proving that the earlier the operation the more favorable is the outlook.

Our records also show that where there is evident metastasis to remote organs the fatal termination of the case is close at hand. We are convinced that remote metastasis should be looked for in all cases of carcinoma of the breast, and, further, that if metastases are found, operation is ill-advised. The patient with distant metastases will live longer by using palliative measures, such as deep x-ray therapy, for relief of symptoms.

Location of Tumor

The right breast was affected in 43 per cent of the cases while the left breast was involved in 57 per cent. There was one case of carcinoma of an accessory breast in the right axilla. Definite information concerning the location of the tumor in the breast was found in only eighty-one cases. These are listed in Table II.

TABLE II. LOCATION OF TUMOR

Outer upper quadrant	43
Outer lower quadrant	16
Inner upper quadrant	7
Inner lower quadrant	3
Center	6
Whole breast	6

We are in doubt as to what significance the location of the tumor may have. Other published reports show much confusion. The metastatic invasion from these areas is as serious from one quadrant as another, so we believe study is of interest, but not significant as to outcome.

Type of Operation

The radical type of operation was performed in 146 cases; semi-radical, in which the pectoralis minor was not removed, in twelve; amputation only in twenty-one, and excision of the tumor mass only in seven cases.

X-ray Therapy

Deep x-ray therapy has been discussed pro and con during the past ten years. Many and varied are the opinions as to its merits in establishing a more permanent cure. Shall we use deep therapy preoperatively or postoperatively or both? The dosage of x-ray advocated during this period varied to such a degree that even radiologists have been unable to satisfy themselves as to the proper dosage.

Some statistics show improved results, some no improvement and some go so far as to think x-ray therapy is detrimental to increasing longevity. However, in this series, ninety-two patients had x-ray in some form either preoperatively or postoperatively. In 90 per cent of these cases it was used postoperatively only. Sixty-seven patients had no x-ray treatment and in twenty-seven cases no record could be obtained. Of the ninety-two patients treated with x-ray, seventeen, or 18.5 per cent, have lived five years or more. Of the sixty-seven patients not treated with x-ray, 16, or 23.7 per cent, have lived five years or more.

Of the patients in our series who have died, we find that those receiving x-ray treatment lived an average two and two-fifths years after operation, while those receiving no irradiation lived two and one-third years. These figures leave us in a great deal of doubt as to the efficacy of x-ray therapy as it is used or has been used in our series. The question of additional cost of medication, coupled with the fact that some patients are markedly sensitive to irradiation, still leaves us unconvinced as to the value of this therapy.

TABLE III. RESULTS WITH AND WITHOUT X-RAY THERAPY

	Cases	Alive after Five Years	Average Years Lived After Operation
X-ray	92	17 (18.5%)	2-2/5
No x-ray	67	16 (23.7%)	2-1/3

Thus, in this series, we are unable to state that x-ray therapy has been of value, nor can we say that it has been a detriment. However, there are several factors to be considered in the analysis of this report. In the first place, no definite routine has been followed in the administration of the x-ray therapy in all the patients receiving it. Secondly, the dosages varied from single exposures, which in themselves differed in intensity, to five or six series given at greatly varying intervals. Thirdly, this report is concerned with all types of cases from the early to the markedly advanced carcinomas. There has been no selection of cases. Consequently, the value of x-ray therapy cannot be accurately judged.

Radium emanations have not been used in this series. Electrocoagulation has been used in most cases during the past four years, but this period is too recent for an evaluation of its effect on end-results.

Tissue in each case has been examined microscopically by competent pathologists. Unfortunately, there has not been, until recent years, any attempt made to classify the type or grade of malignancy, thus making study from this angle impossible.

TABLE IV. END-RESULTS OF FIVE, SEVEN AND TEN YEAR GROUPS

Group	Average Duration of Symptoms	No. of Cases	No. of Cases Living and Well	Living With Recurrence	Dead	Untraced	Per Cent Alive and Well
5 yr.	4 mo.	91	24	2	61	4	26.3
7 yr.	3.8	66	12	1	51	2	18.2
10 yr.	2.6	36	5	0	29	2	13.8

Follow-Up

During the decade from 1919 to and including 1928 there were ninety-one cases of carcinoma of the breast operated on. Twenty-four of these patients are living and well. Two are living with recurrence. Sixty-one are dead and four are untraced, thus making 26.3 per cent of so-called five-year cures. In the seven-year period from 1919 to 1926 there was a total of sixty-six patients, twelve of whom are living and well, one is living with recurrence, fifty-one are dead and two are untraced, giving a percentage of 18.2 for the seven-year cures. In the ten-year group there were thirty-six patients, five of whom are living and well, twenty are dead and two untraced, giving a percentage of 13.8 for ten-year cures.

It is of interest to compare the average duration of symptoms in the various groups. Considering the entire group as a whole, we find that an average of 11.2 months elapsed from the time the symptoms were first noticed until the operation was performed, while in the groups of five-year cures, the average duration of symptoms was only four months and in the seven and ten year groups it was still less. This observation is of utmost significance and should impress upon us the fact that early diagnosis and early treatment are of primary importance.

Of the twenty-four patients living and well five years or over, we find that twenty-one had radical operations and three had semi-radical procedures. Mere amputation or excision of the tumor produced no five-year cures, which is what one would expect in the light of our present knowledge. X-ray treatment was given in eleven of the twenty-four patients while no irradiation was given in thirteen patients. A comparison of the two groups showed that the duration of symptoms, size of growth and presence of metastasis played no apparent role in the giving of the postoperative x-ray therapy. Approximately an equal number of early and late cases were found in both groups.

Conclusions

An attempt has been made to give an unbiased report on results of operation for carcinoma of the breast in the city of Duluth with a population of 100,000. From this study we have formed the following conclusions:

1. We firmly believe that the radical operation as advocated by Halsted and Meyer is the most effective weapon at hand in combating this disease.
2. Early diagnosis and early treatment are of primary importance in securing good end-results in carcinoma of the breast. This is substantiated by the fact that the average duration of symptoms for the entire group was over two and one-half times as long as in the group of five-year cures.
3. A lump in the breast demands biopsy.
4. Irradiation therapy as administered in the cases in this report has had no apparent effect on the results obtained. In our opinion there is a definite need for a co-operative program between the surgeon and the radiologist to assure the administration of proper and effective dosage.

THE TREATMENT OF SEVERE ESSENTIAL HYPERTENSION

Effects of Surgical Procedures Applied to the Sympathetic Nervous System*

GEORGE E. BROWN, M.D., WINCHELL McK. CRAIG, M.D., and ALFRED W. ADSON, M.D.

Rochester, Minnesota

ATTEMPTS to control or reduce high arterial blood pressure have been made, using several types of surgical procedure.

1. Cervicothoracic and lumbar ganglionectomy have been carried out in cases of vascular disturbance of the extremities in which hypertension has been present. In addition, Rowntree and Adson reported one case in which bilateral lumbar sympathetic neurectomy was done solely in an attempt to modify the blood pressure. Significant changes were not noted in systemic arterial pressure.

2. Eradication of the sympathetic nerve supply to the suprarenal glands has been attempted, notably by Crile, and others. Certain technical difficulties make complete denervation of this type extremely difficult to accomplish. Decisive evidence has not been presented to show that the blood pressure has been changed significantly by this operation.

3. Resection of the splanchnic nerves has been carried out, first by Pieri, who in 1930 performed left unilateral resection of the splanchnic nerves in two cases of arterial hypertension. Durante, in 1932, carried out similar operations on the left splanchnic nerves of two patients who were suffering from arterial disease; there was some evidence that systolic and diastolic pressures had been reduced.

One of us (Craig) simplified the technic for resection of the splanchnic nerves, and has carried out this operation unilaterally and bilaterally, including resection of the first lumbar ganglion, in six cases. In two of these cases, advanced or malignant forms of hypertension were present. Three patients represented the early organic stage of hypertension, and had rather high diastolic pressures. In one case relief of severe headache of hypertensive type was noted, and the mean levels and pressor reactions of the blood pressure were significantly reduced. In cases in which there were severe forms of hypertension, with advanced organic changes in the arterioles, effects were not produced. In the more functional form of hypertension, with lesser grades of arteriolar hypertrophy, further application of this procedure is justifiable. It may be said that the operation carries only small risk. Untoward effects have not been noted. Removal of the left splanchnic nerves seems more effective than removal of the right splanchnic nerves.

---

*From the Division of Medicine and the Section on Neurologic Surgery, The Mayo Clinic, Rochester, Minnesota. Read before the meeting of the Minnesota State Medical Association, Duluth, Minnesota, July 16, 1934.

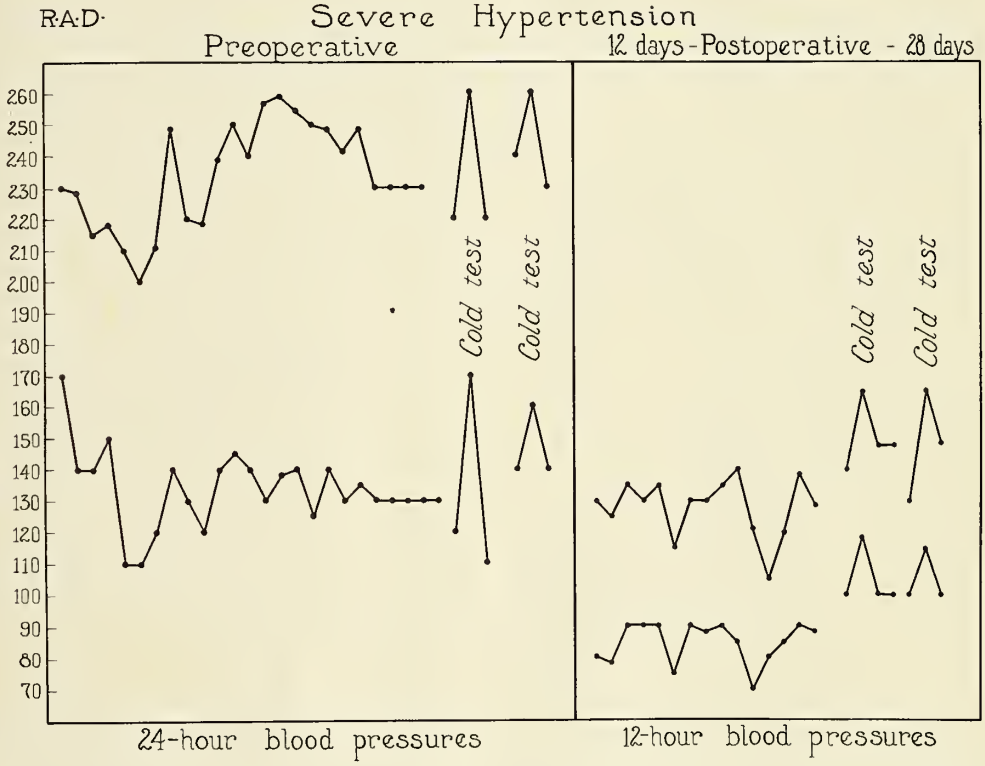


Fig. 1. Hourly records of blood pressure and response to cold of patient before and after operation. Twenty-eight days after operation, at the time of dismissal, his blood pressure in the standing posture was 140 mm. of mercury systolic and 100 diastolic. It will be noted that the maximal response in blood pressure dropped from 260 to 170 systolic, and from 140 to 120 diastolic.

In 1930 one of us (Adson) suggested and performed extensive anterior and posterior rhizotomy on a young man who had a malignant form of hypertension. This procedure removes all of the sympathetic innervation below the diaphragm, and in addition the motor innervation of the abdominal muscles. The rationale of this procedure is based on the fact that (1) following spinal anesthesia the blood pressure is markedly lowered and vasopressure reactions are inhibited; (2) in spite of organic hypertrophy of the arterioles, marked variation and rises in the blood pressure occur. This indicates a prominent neurogenic factor in the hypertension. By resection of the anterior roots, from the second lumbar to the sixth thoracic, all sympathetic fibers are removed from the vessels below the diaphragm. This represents, roughly, more than 75 per cent of the total vascular field of the body. Intra-abdominal tension is reduced by relaxation of the abdominal wall. This creates an increased reservoir for blood in the splanchnic vessels, lessening strain on the cardiac and cerebral arteries.

This report concerns the physiologic effects on the blood pressure following bilateral removal of the anterior spinal roots, from the sixth thoracic to the second lumbar, inclusive, of five subjects. Partial resection was done on three additional subjects, from the ninth thoracic to the second lumbar, inclusive All patients represented severe grades of essential hypertension, of early and malignant forms. There has been one death. In this case the patient's condition was complicated by an adenoma of the medulla of the suprarenal gland, without evidence of paroxysmal crises of hypertension. The operative risk was greatly increased by the presence of the hyperfunctioning adenoma. No attempt will be made at this time to evaluate the ultimate results of this operation. Three years should elapse to determine the remote effects on the blood pressure and on the period of survival.

Clinical Data

The longest period of observation since operation in any one case has been four years. The patient was a man, aged twenty-one years, who had a malignant form of hypertension with extensive retinitis, intense paroxysmal headaches, and inordinately high levels of systolic and diastolic blood pressure. He exhibited sharp hypertensive crises, during which his systolic blood pressure would attain levels of from 280 to 300 mm. of mercury. The prognosis in this type of case usually is for a life of approximately eighteen months after diagnosis has been made, as has been shown by Keith and his associates.

Bilateral resection of the anterior and posterior nerve roots, from the sixth thoracic to the second lumbar, inclusive, after laminectomy, was done. The patient's blood pressure, one month after operation, varied from 140 to 160 mm. of mercury systolic, and from 80 to 110 mm. of mercury diastolic. The headaches and crises of hypertension disappeared. One year and a half later these lower levels of blood pressure were still maintained. Unfortunately, postoperative bleeding developed, which necessitated opening the wound. This was followed by a residue of weakness of the lower extremities.

In the past year seven additional patients have undergone resection of the anterior spinal nerve roots. All represented fulminating or malignant forms of essential hypertension. Marked grades of retinitis and edema of the disks were present. In none of the cases was frank renal insufficiency demonstrable. All the patients exhibited symptoms, usually of a cerebral nature, such as headache and disturbance of vision.

Criteria for Evaluating Effects of Operation

Two criteria for determining the effects on blood pressure were used.

1. Hourly readings of blood pressure were carried out for two or more days, under strict conditions of rest, before operation, to obtain basal levels. The range of variation and the mean levels were determined under condition of activity.

2. The response of blood pressure to a standard stimulus, "the cold test," has constituted a measuring rod to determine the "ceiling" or the maximal rise of the blood pressure.

The maximal response to a standard cold stimulus is constant for the individual, and does not vary materially within periods of months. This maximal vasopressor reaction to cold then becomes an accurate gauge to determine whether the reactibility, or the response of the blood pressure, is affected by a given therapeutic procedure. The effects of changes in posture on systolic and diastolic pressures were determined by placing the patient on a tilting table and taking the blood pressure in the different positions. Complete studies of renal function, urea clearance and sulphate clearance were made, and concentration tests were done. Specimens of muscle were taken for biopsy at the time of operation.

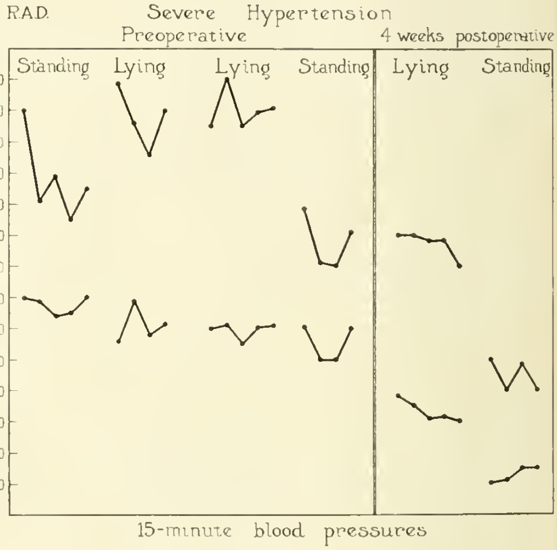


Fig. 2. The effects of posture on the blood pressure before and after operation. There was sharp lowering of the blood pressure in the standing position.

Data

Studies were carried out from three to six weeks after operation, when the patients were up and about. The mean values for systolic blood pressure were from 35 to 100 mm. of mercury less than they had been before operation. The variations in blood pressure were sharply diminished. The average reduction in the vasopressor response to cold was 80 mm. systolic and 45 mm. diastolic. When the patients were recumbent, the levels of blood pressure were higher than when they were upright. With the patients in the latter posture, there was a sharp drop in levels of blood pressure; at times normal levels were attained. In two cases a fall of 100 mm. of mercury systolic occurred after the patients had stood for five minutes. With this fall in pressure, minor grades of dizziness were noted. There was no significant marked rise in pulse rate with the drop in blood pressure. The fall in pressure could be modified by application of a tight abdominal binder. The vasopressor response to cold could be changed by varying the posture of the patients. It was much less when the patients were standing than when they were lying down. One patient, aged fifty-three years, who gave a long history of hypertension, with gradual slow progression in rise of blood pressure, and sclerosis graded 3 of the arterioles of the retina, responded least to the operation. However, when this patient was standing, the blood pressure dropped to a level approximately 50 mm. less than that before operation.

Renal Function

Following operation the patients were given 200 c.c. of water, and their bladders were emptied at the end of an hour. For the group, 60 per cent of the water was excreted when the patients were recumbent, while excretion averaged about 10 per cent when the patients were standing. This represents the effects of lowered blood pressure on the kidneys, delaying excretion of water. The water is entirely excreted, but a longer period of time is necessary. Excretion of phenolsulphonphthalein is not affected by changes in blood pressure that are brought about by change in posture.

Retinal Arteries

Wagener has carried out careful studies and has noted, in two cases, definite relaxation in the vasospastic state of the retinal arterioles. Recovery from changes in vision has been slow. Regression of retinitis has been noted two or three weeks after operation.

Sweating and Vasodilation of Feet

Following operation there is a loss of sweating below the level of the diaphragm. There is excessive sweating of the upper part of the body and of the arms, with high environmental temperatures. The feet become hot and dry, as they are after lumbar ganglionectomy. No other untoward disturbances of function of the abdominal organs have been noted. Several patients have stated that constipation has developed following the operation, but complete studies on this problem have not been carried out. There have been no demonstrable changes in gastric motility.

Untoward Effects

Pain in the legs, which persisted for two weeks or more after operation, was complained of by three patients. There usually is some subjective hyperesthesia of the skin of the thighs. Some generalized weakness has been present in all cases. This would seem to be due to the reduction in blood pressure. One patient was troubled by urinary retention, for which a retention catheter was required for several months. Weakness of the abdominal muscles is present, but objective bulging of the rectus muscles is not.

Comment

Section of the anterior nerve roots, in cases of severe essential hypertension, at varying levels, above and including the second lumbar segment, has caused significant changes in the mean levels and in the reactibility of the blood pressure. Relative hypotension develops when the patient assumes the upright posture. The changes in blood pressure that appear with changes in posture probably have a two-fold basis: (1) the loss of the vasomotor control of the arteries in the splanchnic region whereby there is loss of compensatory adjustment with change in posture, and (2) diminished intra-abdominal tension from loss of tonus of the abdominal muscles. The importance of the latter could be demonstrated by reduction in the fall of pressure with the application of a tight abdominal binder. In no case has complete restoration to "normal" levels of blood pressure been obtained. We would conclude that such restoration would be impossible because of the organic hypertrophy that has occurred in the smaller arterioles, and because a considerable portion of the vasomotor nerves to the upper portion of the body remains. Biopsy of muscles has revealed quantitative narrowing of the caliber of the arterioles as compared to the thickness of the walls. It is not known whether regression of the hypertrophy will take place with lowered blood pressures. Diminution in the transverse diameter of the heart could be demonstrated with the teleoroentgenogram after operation in two cases.

It is of interest to note that, with these sharp changes in blood pressures, function of the kidneys has not been significantly affected. This indicates a large range of blood pressure above the level necessary for normal activity of the organs. This seems to dispose of the idea that these excessive pathologic levels of blood pressure are beneficial in any degree. If reduction of systolic blood pressure were accomplished, to levels less than 100 mm. of mercury, it is probable that shock would be encountered.

The reduction of the pressor reactions to stimulation is probably of great importance in hypertension. It has been shown that the "hyper-reactibility" of blood pressure is the earliest abnormality demonstrable in subjects who have early essential hypertension. This hyper-reactibility constitutes excessive wear and tear on arterial tissues, and may be the major cause of the organic changes that occur in advanced forms of hypertension. Therefore, it has seemed of extreme importance to modify or reduce this hyper-reactibility. Resection of anterior roots accomplishes this to a significant degree.

Selection of subjects for operation is of paramount importance. Subjects less than fifty years of age, who have a relatively short history of hypertension, who present a serious prognosis, who have adequate function of the kidneys, and in whose blood pressure reactions there is a large spastic element, as demonstrated by the excessive response to cold, and to emotional and other stimuli, are primary requisites. Accurate information concerning the degree of change in the arterioles can be determined by study of the retinal vessels and by measurement of the arterioles obtained in biopsy of muscles. It is obviously unwise to submit patients to operation who have excessive hypertrophy of the tunica media, or who have had irreparable injury to the function of the brain, heart, or kidneys.

Patients who have severe forms of hypertension have a disease which carries with an extremely grave prognosis, comparable to that seen in cases of malignant tumors. The duration of life in severe cases, the Groups 3 and 4 of Keith and his associates, is about three years, and this is related in some degree to the amount of arteriolar hypertrophy. The important thing brought out by this study is that for the first time, to our knowledge, it has been demonstrated that by separating from the vasomotor control a large segment of the arteriolar bed, significant changes in the levels and responses of blood pressure are effected, for at least periods of months. This supports the concept that the fundamental abnormality in essential hypertension is central. There is experimental evidence leading to the belief that the vasomotor center in the diencephalon is hypersensitive or too reactive to stimulation. There is an analogy to the vasomotor irritability in Raynaud's disease. Separation of the peripheral mechanism from central control effects cure in the uncomplicated forms. In both diseases hyper-reactibility to stimulation seems to be the primary disturbance.

Summary

Bilateral resection of the anterior motor roots in severe forms of essential hypertension, for varying segments above and including the second lumbar roots, effects marked changes in the mean levels and in the responses of the blood pressure to stimulation. The upright posture causes a marked fall in blood pressure. These changes have been maintained for periods of months. The ultimate value of this operation on the course and progression of these serious types of hypertension is not known.

Bibliography

1. Brown, G. E., and Craig, W. McK.: The physiologic effects of unilateral and bilateral resection of the major and minor splanchnic nerves in man. Tr. Assn. Am. Phys., 48:213, 1933.
2. Crile, G. W.: Recurrent hyperthyroidism, neurocirculatory asthenia and peptic ulcer; treatment by operations on suprarenal-sympathetic system. Jour. Am. Med. Assn., 97:1616-1618, (Nov. 28) 1931.
3. Durante, L.: Die Resektion der Nervi splanchnici (Pendesche Operation) bei der juvenilen Gangrän infolge von Endarteritis obliterans und bei der Raynaud'schen Krankheit. Wien. med. Wchnschr., 82:1075-1077, (Aug. 20) 1932.
4. Hines, E. A., Jr., and Brown, G. E.: A standard test for measuring the variability of blood pressure: its significance as an index of the prehypertensive state. Ann. Int. Med., 7:209-217, (Aug.) 1933.
5. Keith, N. M., Barker, N. W., and Kernohan, J. W.: Histologic studies of the arterioles in various types of hypertension. Tr. Assn. Am. Phys., 46:66-68, 1931.
6. Pieri, Gino: Quoted by Santucci.
7. Rowntree, L. G., and Adson, A. W.: Bilateral lumbar sympathetic neurectomy in the treatment of malignant hypertension: report of case. Jour. Am. Med. Assn., 85:959-961, (Sept. 26) 1925.
8. Santucci, Gastone: La therapeutique chirurgicale de l'hypertension arterielle selon la methode de Pende. Clinique, Paris, 27:9-11, (Jan.) 1932.

DISTURBANCES IN PERIPHERAL CIRCULATION*

Clinic in Medicine

GEORGE E. BROWN, M.D.
Rochester, Minnesota

I THOUGHT it might be of value this morning to present several patients suffering from what formerly were thought to be uncommon types of diseases of the blood vessels. This is a subject of course in which I am greatly interested.

The interest of the medical profession in diseases of the blood vessels has been rather sporadic. There was a time when the aorta was the center of attack, and knowledge of aortic diseases became greatly extended. Information on lesions of the coronary arteries was increased in a similar fashion. Interest was stimulated, diagnosis became very accurate, and the incidence of cases became increasingly great. There is the old adage, of course, that we see only what we look for. Our information on vascular diseases that affect the extremities is passing through a similar transformation.

There are a few historical points that I think would bear repetition. The first is that American physicians have played a major rôle in the identification of these diseases. Weir Mitchell was the first to describe erythromelalgia. Buerger described the clinical and pathologic aspects of thrombo-angiitis obliterans (Buerger's disease). These are two great contributions to American medicine.

The diseases affecting the blood vessels of the extremities are so easy to study, so exposed to your eye and to your fingers, and so susceptible to accurate determination by functional studies that progress has been remarkable and rapid, thus leading not only to more accurate diagnosis but also treatment. One thinks of the progress in our knowledge of gastric lesions, and how much more rapidly that knowledge would have increased if the lesions could be exposed to direct inspection, and if the evolution of the pathologic lesions could be followed in their entirety.

From the standpoint of classification of the diseases of the peripheral blood vessels there are two major types, the vasomotor and organic, and their differentiation is extremely simple. The blood vessels have special nerves that regulate their size and activity, the vasomotor nerves. These nerves have two functions; one to close the vessels and one to open them. These functions are kept in delicate balance, depending on the physiologic needs of circulation. Whenever this balanced physiologic condition is maintained there is normality; when there is tipping of this balance disease manifests itself. We would expect, on a priori grounds, that where we have blood vessels under control of the brain, and affected by temperature there would be disturbances of this vasomotor balance, which are recognized as vasomotor disorders. The vasomotor disturbances are usually clean-cut, and no question of differentiation of the vasomotor organic forms arises in 95 per cent of cases in which patients have disturbances in color and temperature of the peripheral parts.

There is the second group in which the patients have obstructive lesions of the arteries. The arteries are either closed or open. If they are open the disturbance is probably vasomotor; if closed, it naturally is obstructive.

There are only two types of disturbances of the vasomotor group: those that open the blood vessels too much, and those that close them too much. One disease in which there are abnormal degrees of vasodilation is erythromelalgia. In its true primary form it is an exceedingly rare disease. I have seen only eleven cases of erythromelalgia, gleaned from a large amount of clinical material. There are episodes or attacks, involving the hands or feet, in which too much arterial blood enters these parts. The effect of this is redness and a marked increase in surface temperature. It is a very distressing functional disease. It usually occurs among young men. Attacks of excruciating burning of the feet or hands are experienced; with the burning the greatly augmented circulation can be visualized. The veins are distended with arterial blood, the capillaries and venules are dilated, and all are open. The sensation of burning pain parallels the excessive flow of arterial blood. The attacks last a few hours, sometimes less. Relief is obtained by elevation of the extremities or by putting them into cold water.

---

*Medical Clinic given before the annual meeting of the Minnesota State Medical Association, Duluth, July 18, 1934.

The first patient I saw who had erythromelalgia made a great impression on me. He was a painter who had great and continued pressure on his feet from working on a ladder (I don't know whether or not this was of etiologic significance). An excruciating paroxysmal burning of the extremities developed which progressed to a point where he was totally disabled. This man lived on the banks of the Mississippi River during hot weather, and he would walk barefooted in the cool wet sand. By this he made his life bearable for a number of years. Eventually he committed suicide. At the present time there is no adequate treatment of this condition, which, fortunately, as I have said, is rare.

In contrast to such vasodilating disorders are disturbances that constrict the blood vessels. The most common type is Raynaud's disease. Raynaud's disease is a fairly well-defined disturbance in which, however, the borderline between the normal and the abnormal is extremely fine. One sees many normal girls who have cold, moist, bluish extremities when exposed to cold. These borderline conditions are designated as vasoconstrictive disturbances of the Raynaud type. A common name is acrocyanosis. It is usually symptomless, but from the esthetic standpoint it constitutes a mental discomfort. With the more advanced forms, however, a condition arises that is distinctly and truly a disease. Raynaud's disease is peculiar in that 90 per cent of the patients are women. These subjects react excessively to cold or to emotion. The hands or feet become white or blanched or cyanotic. With recovery from the attacks, the vessels open up too much, and the parts become excessively red. This condition is always bilateral. The symmetrical nature of this vasoconstrictive disorder is very important in the differential diagnosis, because there is a group of patients who have changes in color of the extremities that are unilateral and which accompany organic disease of the vessels or nerves.

Raynaud's disease in its incipiency is a purely functional affair, such as blushing, or pallor with anger. Transpose this reaction to the extremities and it is Raynaud's disease. Why it is confined to the female sex we do not know.

Allen, who has been working with us at the clinic, has been doing some very interesting work with the injection of a preparation of thorium into the arteries. This allows visualization of the arteries with roentgen rays. Among patients with Raynaud's disease the arteries of the hands have a distinctive architecture. They have a very fine, thready appearance. It seems to us that these subjects have a constitutionally inadequate development of the blood vessels, with small hearts and low blood pressures. Raynaud's disease occasionally becomes very serious because of ulcers or sclerodermal change in the skin. Operation on the sympathetic nervous system usually gives complete relief.

The group of patients who have occlusive arterial disease presents a different problem. There are two main types of this disease that are of importance: one that occurs in youth and middle age, and one that occurs with more advanced age. The type that occurs in old age you are all familiar with, the so-called senile gangrene, arteriosclerosis obliterans, with or without diabetes. I don't like the term "diabetic gangrene" or the term "arteriosclerotic gangrene." We should make our diagnosis and advise these people long before they get gangrene. In other words if gangrene develops we have entered into the picture too late.

The other type is Buerger's disease or thrombo-angiitis obliterans. Those of us who are seeing more patients with this disease all the time take the attitude that a surgeon does when he encounters a patient with an appendix that is abscessed; if the extremity is gangrenous, "we just haven't done right by them." However, our knowledge of this disease has improved to a point where the incidence of gangrene has been materially reduced.

When thrombo-angiitis was first described it was thought to be confined to the Jewish race. It was called the "Yiddisher Krankheit." This was based on the fact that the clientele of the doctors and physicians who were chiefly interested in this disease was largely Jewish. The racial aspects have changed very materially. Our first group of statistics at the clinic indicated that 54 per cent of the patients who had Buerger's disease were Jewish, 46 per cent Gentile. Our last study revealed that 27 per cent were Jewish, the remainder Gentile. Apparently the question of race is becoming less important as years go on.

I am going to present two patients who have this disease in its typical aspect.

The first patient, Mr. B., represents probably a typical example of the disease. He is forty-five years of age, a Gentile, and his history is as follows: While in the army, eighteen years ago, he noticed the first symptoms. The initial symptom in this disease is important because the physician recognizes at once that something is cutting off the circulation to the extremity. The result is coldness of the extremity and reduction in the amount of walking the patient can do. In this case the left leg was involved first.

"How much later did you notice involvement of the right leg?"

Mr. B.: "Two or three months."

He felt coldness of the foot, diminished temperature, and reduction in the amount of exercise he could take. The fact that the right foot was involved soon after the left indicates that the disease was actively progressing. The involvement in this disease is always bilateral. If you find a patient with only one extremity involved, within one month to ten years the disease will appear in the opposite extremity, and in 40 per cent of cases it will eventually be present in the arms also. The patient went through a period in which both legs became definitely reduced in their blood supply. "You were conscious of that in walking. How far could you walk?"

Mr. B.: "A mile."

"How did that vary in the next five or ten years?"

Mr. B.: "The amount of exercising I can do has been diminishing ever since."

"How greatly reduced has been the distance you could walk?"

Mr. B.: "To about a block, a couple of months ago."

That tells us very accurately that the amount of closure of the vessels is increasing in the major and collateral circulation. I don't know any instrument of precision that can tell the quantity of blood circulating through the lower extremities as well as the patient's statement as to how far he can walk.

The sad part of such stories is that, as a result of some infection in a toe, some minor trauma, excessive cold, perhaps a ring-worm infection between the toes, infection is likely to occur. Ulcers and gangrene develop and the patients go through very trying periods, as Mr. B. did, and they may lose an extremity. This occurred in Mr. B.'s case four years ago. His remaining leg has become pretty well compensated, and has improved to the point where he can walk a mile.

One could develop a graph depicting the course of the disease in this case: reduction in the amount of exercise, with a low point when he lost a leg as a result of an infection; gradual resumption and improvement of the circulation back to the point where he started eighteen years ago at the onset of the disease.

The tragedy is that he has lost a leg. The more we learn about this disease, the more our efforts are concerned to the end that amputations should be avoidable. The incidence of amputations is fortunately on a downward curve. Buerger's original statement was that a fairly high percentage of patients lose an extremity. The percentage has been reduced from forty until now it is less than eight. We feel that it will eventually be less than five.

The avoidance of amputation depends largely on early diagnosis, because if a patient knows he has poor blood supply in his extremities he learns to take proper care of them. He avoids the things that get him into trouble; that is half the battle.

The treatment of Buerger's disease has been extremely satisfactory from many standpoints. There are certain things that can be done in an effort to prevent gangrene; first, the patient should be instructed in the elementary care of the extremities; our first advice to the patient is that the extremities should be kept warm at all times. The second thing is that the patient should never put anything on the extremities that causes any irritation, such as solutions containing iodine, carbolic acid salves, or irritating ointments. Such procedures have been the cause of gangrene in 30 per cent of our cases. The third thing is that the patient should never cut, never injure, or produce any trauma in trimming nails or corns. These admonitions sound trivial, but when one realizes that an ulcer or gangrenous lesion may be initiated by some simple interference with poorly vascularized skin, one realizes how important they are.

From the standpoint of more active treatment, after careful selection about one in three of these patients undergo sympathectomy. We find that there are two factors in the reduction of circulation in the limbs; one organic closure, and the other vasoconstriction in the collateral arteries. It is this vasomotor factor that can be removed by sympathectomy. The blood supply to the extremities can be markedly increased by removal of the vasomotor fibers.

A more recent development in therapy has been the advent of tissue extracts in the treatment of claudication. These are opening up a new field of therapeutics and the results so far have been encouraging. Both of these patients have had treatment with tissue extracts.

The second patient, Mr. K., is fifty-nine years of age. He has gone through a very similar course of events to that of Mr. B. in a period of about eight years. The disease has probably run its course in these eight years, whereas Mr. B., after sixteen years, is still having periods of activity of the disease, as shown by the recurring superficial phlebitis.

What I am interested in demonstrating in Mr. K.'s case is the significant effects on claudication of the treatment by tissue extract. Claudication is the most pathognomonic symptom we have in medicine. It is quite comparable to constrictive pain in coronary sclerosis. It is a constant symptom in that, after a given amount of exercise, the patient has to stop for one or two minutes; the same amount of exercise can then be repeated. The distress is described as a cramp, or excessive fatigue, in a group of muscles, usually in the calf or in the foot. I am going to ask Mr. K. to describe exactly what that sensation is.

Mr. K.: "In my case the sensation is always in the foot. It is so painful that I have to stop walking."

"How far could you walk five years ago?"

Mr. K.: "I could walk two or three miles."

"How has that changed in the last five years?"

Mr. K.: "Last winter, out in the country, my car froze, and I nearly froze my remaining foot. After that I could not walk at all. Later I got so that I could walk about fifty feet."

In other words, within a period of, say forty-eight hours, his tolerance to exercise reduced from ability to walk a mile to ability to walk fifty feet. This indicates that the patient must have had an ascending thrombosis that probably involved the femoral artery at least as high as the middle of the thigh.

"How did the condition change in the next month or two?"

Mr. K.: "I stayed off my foot for six weeks, and the condition didn't get very much better until I went down and tried your tissue extract."

Here was a man who apparently had reached an impasse in his ability to walk as a result of thrombosis of the major arteries of his remaining leg. I didn't see Mr. K. when he was down for treatment, but I saw his records and they were very convincing.

The extracts we used in these two cases were of three types. One is obtained from the pancreas, one from skeletal muscle, and one from heart muscle. The active principles in these extracts are not well understood. Apparently there is some common substance that seems to be responsible for the remarkable change that takes place in relieving claudication. This substance is believed to be adenosin. It is one of the amines. By giving a patient some pure adenosin triphosphate, results can be effected which are fairly comparable to those obtained by using pancreatic or skeletal muscle extracts.

The treatment we have carried out, using Mr. K. as an example, is as follows: the pancreatic extract is usually injected into the muscle, in amounts of 3, 4 or 5 c.c. Miss Roth, who is investigating this work, takes these patients for what she calls a "military hike." Using a stopwatch, and stepping two steps a second, or 120 steps a minute, she notes the time when for them to continue walking becomes impossible. We thus have a measuring rod. We take these patients, quickly pacing with them so they don't lag; they will come to a stopping point and say, "I can't go any farther."

"Before the treatment, Mr. K., how long would it take you to make that trip down the corridor?"

Mr. K.: "Not much more than a minute."

"Did you notice any change the first day?"

Mr. K.: "Yes, I noticed a change after every injection."

"How much did it step up your walking time?"

Mr. K.: "I think it almost doubled."

"Would each injection still keep doubling the time?"

Mr. K.: "Yes."

"What was your maximum walking time after a series of treatments?"

Mr. K.: "Twelve minutes."

"You increased approximately 1200 per cent, twelve times your walking time; with how many injections?"

Mr. K.: "About six or seven."

"About two or three days apart?"

Mr. K.: "Yes."

That is an extraordinary thing when you think about it; with the use of the extract his walking time was increased twelve times, a 1200 per cent change within a period of ten days or two weeks.

This treatment is successful in about 85 per cent of the cases. How does it work? We have always thought the symptom of claudication was like the distress from coronary disease. We have been studying these extracts trying to find out how they act. We know they do not dilate the blood vessels because we can take accurate measurement of surface temperatures, and no change occurs. These patients for some reason or other, have the capacity in their muscles for exercising much more efficiently with the introduction of some substance. We feel now that there is some substance in the body, common perhaps to all tissues, that supplies a key substance in a contracting muscle that lacks sufficient blood. If this is true, it of course opens up many very interesting things from the standpoint of treatment of muscular diseases. We have not applied this treatment in coronary disease, but it should have similar effects.

I am bringing up these things rather quickly, because they represent some rather active progress that has taken place in the treatment and consideration of these diseases about which we formerly have been rather pessimistic. As I say, we feel chagrined that these two men had to lose an extremity. Perhaps if they had had the disease ten years later they would have escaped it.

There is so much being written on diseases of the blood vessels at the moment that the whole problem sounds rather complicated. One might think that complicated devices were necessary in order to make the diagnosis and carry out treatment in these cases. This is not true. For the diagnosis of these conditions the only instruments needed are the eyes and fingers. One can see changes in color on exposure to cold, and one can feel pulsations, or detect the lack of them, in peripheral blood vessels.

It is rather strange that in a complete physical examination these pulsations of the peripheral arteries are not noted once in a thousand times. I am certain that this is true, and yet in spite of the fact that here is a most simple examination, pulsations in the dorsalis pedis, posterior tibial, popliteal, femoral, ulnar, and radial arteries for some reason are not examined routinely.

If disease of the blood vessels is suspected, absence of pulsation is easily detected. For instance, this man had weakness and distress of the leg, and was tired after walking a certain distance. The first thing one should think of is the blood supply.

We are very assiduous in examining the lungs and heart, but we forget that tissues need blood. The first thing to consider in any disturbance in the leg or arm is whether or not the part is getting sufficient blood. By simple palpation of the arteries one can determine whether the involvement is of obstructive or vasomotor origin. If the condition is of obstructive origin, considerable responsibility rests on the physician in the prevention of loss of that limb.

INSOMNIA*

GORDON R. KAMMAN, M.D., F.A.C.P.
Instructor in Nervous and Mental Diseases, University of Minnesota
Saint Paul

BECAUSE of the already existing mass of medical writing on the subject of insomnia, another contribution to the voluminous literature devoted to this sympton really should begin with an apology. However, when one pauses to contemplate the mass of non-medical literature on the subject and becomes cognizant of the pernicious implications contained therein, another scientific consideration of insomnia seems somewhat more justifiable than at first glance.

The evils of sleeplessness have been emphasized in everything from the holy scriptures, through the manuscripts of Shakespeare, to modern magazine advertising. The beneficent influence of slumber has been alluded to in the literature of practically every period of human existence and it is small wonder, therefore, that the problem of sleep has been one of the major preoccupations of mankind from time immemorial. In modern times barely a month goes by that our enterprising drug industries do not present at least one new sedative to the medical profession. The writer recently made an effort to determine through a national statistical bureau approximately how much advertising space was devoted in the United States each year to the propagandizing of commodities whose main function was the promotion of restful sleep. It was reported that because of the extent of such a project the expense of compiling pertinent data would be prohibitive. The answer to this must be that the problem of the induction of sleep is one that is very imperfectly understood by those charged with the responsibility of its management, namely, the medical profession.

---

*Read before the Minnesota Society of Neurology and Psychiatry, at the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

It has been said that a physican's art stands in inverse proportion to the amount of opium and opium derivatives he prescribes. Yet, the armamentarium of the present day physician is overburdened with products of countless enterprising manufacturing chemists. The fault seems to be that the physician relies too much on medicines and the statements of pharmaceutical detail men, and is not willing to devote enough time to get at the basic cause of what he is trying to treat. Time and again patients have come to me glibly stating that they have been taking such and such a preparation for so many months or so many years under the direction of a physician, no effort at causal therapy ever having been made!

As with all other medical problems, a discussion of insomnia should begin with a consideration of its cause or causes. It is not necessary here to discuss the various theories as to the true nature of sleep. None of the four or five popular theories has ever been proven. Suffice to say, however, that sleep seems to be primarily a function of the nervous system. It is a period of physical and psychological recuperation which apparently is instinctive. Von Economo in his masterly discussion of that amazing disease encephalitis lethargica has shown us that in the brain there is a sleep center. This center is situated in an area of gray matter in the posterior third of the lateral wall of the third ventricle. We know that sleep has to do with inhibition or decreased activity of the cerebral cortex—a diminished state of consciousness. Intellectual activity (worry, excitement, the conscious appreciation of physical discomfort, etc.) interferes with sleep. Pavlow has shown that the repeated action of a conditional stimulus produces sleep. For example: if a dog is conditioned to salivate at the sound of a bell by showing him food every time the bell is rung, and then the bell is rung a number of times without showing any food, the dog will not salivate but will go to sleep. This tends to show that stimulation of some cortical areas tends to inhibit neighboring areas, and eventually this inhibition spreads over the entire cerebral cortex and causes sleep. It is possible, therefore, that sleep is a multi-conditioned reflex: *i.e.,* darkness, disrobing, getting into bed, silence, and a host of other routine activities amounting almost to ritual, act as "conditioners" tending to promote inhibition of the cerebral cortex and produce what we call sleep. With these facts in mind it is easy to see how any form of cortical activity, even so simple a process as the counting of sheep, would tend to keep one awake. This point of view will aid in understanding psychogenic insomnia which will be discussed later.

Reference was made above to the desirability of causal therapy in insomnia. Before causal therapy can be instituted in any disorder a knowledge of its etiology is essential. Following is a modification and elaboration of Anthony Feiling's[1] classification of the etiologic factors in insomnia:

1. Bad habits.
    Lying in bed late in the morning.
    Dissipation and dietary indiscretions at night.
2. Purely external causes.
    Noises, extremes in temperature, uncomfortable bedding, crowding, etc.
3. Physical diseases.
    a Pain or severe discomfort from injury or disease.
    b Toxemic states in infectious diseases or intoxication from uremia, alcohol, hyperthyroidism, caffeine.
    c Disorders of the cerebral circulation as in hypertensive heart disease, and severe anemias.
    d Structural diseases of the brain, such as arteriosclerosis, brain tumor, syphilis, senile changes, acute and chronic encephalitis, and post-traumatic states.
4. Psychoses.
5. Emotional disturbances, such as anxiety states, hysteria, neuroses, and psychoneuroses.

A large proportion of our insomniacs belong to the last group and are the most difficult of all to treat. Obviously, when the sleep disorder can be traced to bad habits, environmental disturbances, physical disease, or to a psychosis, the treatment must be directed at one of these factors and the insomnia regarded as an incidental matter. However, in what I have termed true psychogenic insomnias, namely, those insomnias in which lack of sleep is the only complaint the patient has to offer when he first consults his physician, the problem of treatment is much more complex.

The neuro-insomniac, if such a term is permissible, places major emphasis on his inability to sleep. "If I only could get some sleep I would be all right," is a phrase with which all of us are only too familiar. It is in these cases that the physician is apt to fall into grievous error by the indiscriminate exhibition of a great variety of sedatives, usually barbiturates, without delving into the patient's emotional life and finding there the cause of the insomnia. To treat these patients chemotherapeutically without any thought of psychotherapy merely makes matters worse and frequently creates an addiction to the idea of the need of a sedative. I feel that in this instance an individual can become addicted to an idea very much as others might become addicted to a narcotic drug. In the first case it is not the drug that the patient craves, but the taking of a sedative is the materialization of his conviction that in order for him to be normal he must have some sleeping medicine.

There are several rather constant characteristics of the neuro-insomniac. First, he usually falls into either one of two groups. Either he really does lie awake and obtains only a minimum of sleep, or he really gets enough sleep necessary for the conservation of health but insists that he needs still more. Sleeping hours pass so quickly and waking hours so slowly that the insomniac always underestimates the amount of sleep he obtains.

The second characteristic of the neuro-insomniac is that he is possessed by an intense fear of the consequences of lying awake. The uninformed and therefore fearful patient begins in mid-afternoon to dread the oncoming night. By the time he is ready to retire he has worked himself up into such a state of intense cortical excitement that inhibition is impossible, and sleep does not come. After he gets to bed he has his watch and a flashlight on the bedside table, and every fifteen minutes or so he notes the time and becomes progressively more apprehensive and fearful with the passage of each quarter of an hour. He employs all of the time-honored devices which he believes will put him to sleep—sheep counting, concentrating on sleep, counting by fives to ten thousand, and numerous other rituals. This merely tends to keep his cerebral cortex more active and the sleep center is powerless to inhibit it. According to Klingman,[2] thought on any subject is perfectly harmless to an individual providing there is no accompanying emotion. If one merely thinks of a burglar there is no reaction. If one actually sees a burglar, gun in hand, coming through the window at night the emotion of fear springs into consciousness. In other words, the emotion of fear has been added to an idea and a complex has been formed. A complex is an idea plus an emotion. For example, add to the simple thought of sleep the fear of not being able to sleep, and one has a complex. This complex is very prevalent among neuro-insomniacs.

The reason why the neuro-insomniac usually goes to sleep at four or five in the morning is because he gives up trying to do so and says, "What is the use of trying any longer, there is no time for decent sleep anyway." He breaks up his complex by removing all emotion. His cerebral cortex then becomes inactive, the sleep center causes a wave of inhibition to spread over it, and the individual falls alseep. I always emphasize the fact that sleep is natural, it is automatic, instinctive, and is disturbed only when interfered with. Therefore, when the insomniac stops interfering with sleep, *i.e.,* stops fretting, worrying, and fussing, his sleep center will do the rest.

The third characteristic of the neuro-insomniac is that he usually feels that he is very much misunderstood and abused. True, he is misunderstood, but not in the sense that he thinks himself to be. Because neuro-insomnia is a white-collar product, an inevitable result of our modern intense high-pressure manner of living, it is frequently thought of by the laity, and also by too many physicians, as an "imaginary" disorder. This does the insomniac a great wrong, and his feeling of abuse and of being misunderstood is well founded. These people actually need expert attention. They are really maladjusted and their suffering is just as genuine as the suffering caused by gastric ulcer, cancer or any other disease.

We see, therefore, that the condition demands treatment. When the insomnia is the result of some underlying physical disease, or of external causes, a psychosis, or bad habits, the treatment is relatively simple and usually consists solely in an attack upon the cause. However, in genuine insomnia of purely psychogenic origin, *i.e.,* what I have called neuro-insomnia, the treatment is somewhat more involved. This is true because the cause is more difficult to determine, the condition is usually of long standing, and the patient has acquired some bad habits of thought that must be corrected. This usually necessitates a lengthy process of re-education. It is my purpose to discuss the treatment of only this type of insomnia.

The treatment of neuro-insomnia may be divided into three different parts. These are chemotherapy, physiotherapy, and psychotherapy. All three must be administered simultaneously, as without one the other two are ineffective. Let it be emphasized from the start that one of the prime prerequisites to the treatment of neuro-insomnia is a conviction on the part of the attending physician that he will get results. This confidence on the physician's part will be communicated to the patient, and the therapeutic effectiveness of the various procedures employed will be greatly enhanced. The tremendous therapeutic value of the power of suggestion must ever be borne in mind. Witness the marvelous soporific effect of a large placebo capsule in a goodly number of cases of insomnia! The next thing that should be borne in mind in our treatment is the value of a definite and fixed routine for each individual patient. There is no routine that will fit all patients, and the treatment must be individualized. However, every patient must be admonished to do the same thing at the same time every evening. If, as has already been intimated, sleep is a multi-conditioned reflex, the necessity of a definite routine will be appreciated.

The least important part of the treatment of neuro-insomnia is the administration of sedatives. A large number of psychotherapeutists and psychopathologists are opposed even to the occasional use of hypnotics in this condition.[3] Among these may be mentioned Dubois, Pierre Janet, Freud, Jung, Alfred Adler, MacDougal, Morton Prince, and Dejerinne. According to Meyer Solomon[3] these objections are based on the following beliefs:

1. It is not causal treatment.
2. There is danger of toxic effects.
3. There is danger of addiction, and self-medication may ensue.
4. The drugs may be used for suicidal purposes.
5. Their use is a temporary and not a permanent solution.
6. It is a resort to an artificial crutch.
7. It is an easy way out—the line of least resistance.
8. Other necessary treatment may be neglected by the physician, or patient, or both.
9. It gives the patient a wrong idea of the causes and of the fundamental importance of the psychotherapeutic aid required.

However, in spite of these objections it is my belief that soporific drugs occupy a place in the treatment of insomnia. The derivatives of barbituric acid seem to be the most popular drugs now in use, but I must insist that they be used over comparatively short periods of time, be changed frequently, and their importance minimized to the patient. Psychologically, we believe in the stimulus of success, and sometimes giving our patients four or five nights good sleep will break up their complex by abolishing fear, and they will be started on the road to recovery.

When selecting a sedative the following criteria should be borne in mind: harmlessness, good therapeutic effect, rapid destruction in the body, rapid induction of sleep without preliminary stage of excitement, absence of hang-over, palatability, absence of habit-forming properties, and low cost. Not until all of these factors are taken into consideration is the physician justified in prescribing a sedative in a case of neuro-insomnia. Because of the fact that some patients become addicted to the use of barbiturates, especially barbital (Veronal), I feel that legislation making it unlawful for anybody to sell these preparations without a physician's prescription should be encouraged, and that these prescriptions be not refillable. Such legislation is already in force in England and also, I believe, in some of our own states.

Under physiotherapy, the following procedures are usually beneficial in the treatment of insomnia. First, the patient's habits must be so ordered that the evening meal is always taken at the same hour, and that the same amount of time is allowed to elapse every evening between eating and retiring. Ritual appeals to many people, especially neurotics. Second, a warm bath (Dauer bath) immediately before retiring tends to promote both physical and mental relaxation. The temperature of the bath should be between 95 and 98 degrees F., and the patient should remain in it for from twenty minutes to half an hour, with an ice cap to his head. Sometimes in hospital practice we use the neutral moist body pack instead of the Dauer bath. It goes without saying that the patient's sleeping chamber should be the proper temperature, the bed comfortable, and the room quiet. In some of the German clinics I have seen preparedness for sleep (Schlafbereitshaft) augmented by generalized diathermic autocondensation and encasing the legs in wet stockings (Wadenbindung). Cold compresses to the abdomen sometimes are beneficial to the patient. No food should be eaten late at night, but a hot drink may be taken at bedtime.

Undoubtedly the most important phase of the treatment of neuro-insomnia is psychotherapy. The first thing to do is to abolish from the mind of the patient all fear of lying awake. No one has ever died from lack of sleep. Many insomniacs fear that brain cells will be destroyed by lack of sleep. As a matter of fact, sleep does not promote mental growth.[2] The farther down we go in the animal scale, the more sleep we encounter. Infants and adult idiots spend much of their time in sleep and those who grow the least physiologically and mentally sleep the most. After divesting the patient's mind of fear, we must teach him to *cultivate an attitude of indifference toward his problem.* This is necessary in a great many psychogenic disorders, and I have phrased this admonition advisedly. First, the attitude must be cultivated. We cannot ask our patient to dismiss his own special preoccupations instantaneously. The task must be undertaken gradually, like the learning of a new language or the playing of a musical instrument. Next, the attitude must be one of indifference. Indifference implies absence of anxiety, and the abolition of anxiety allows the breaking up of the insomnia complex, the activity of the cerebral cortex decreases, inhibition takes place, and sleep ensues.

The next step in the treatment of insomnia is an effort to find out whatever in the patient's emotional mechanisms or in his life situation is responsible for either his sleeplessness or else his desire to be out of contact with reality for a longer period of time each twenty-four hours than is necessary for normal recuperation and rest. In these latter cases, the patient must be taught, not how to sleep, but how to remain awake longer. Many people have some overt worry which haunts them at night. Many have the bad habit of thinking and planning for the next day after having relived all of the events of the one just passed. There is also the type of patient who denies that he worries. He keeps his cerebral cortex active by trying to keep out of consciousness his daytime perplexities and preoccupations. Sometimes when the patient's sleep is disturbed by dreams, especially recurring dreams with the same content, we can find in them by analysis symbolic expressions of an unsatisfactory life situation which must be remedied.

Obviously cases falling into these groups are individual problems and must be treated as such. Their solution lies, not in the indiscriminate administration of sedatives, but in a careful analysis and elimination of the underlying psychogenic causes. This requires patience, diligence, and, above all, a thorough understanding of the various psychopathologic processes at work in each individual. This, in my opinion, is the most important factor in the treatment of that much mismanaged and all too prevalent disorder, neuro-insomnia.

1125 Lowry Medical Arts Building

References

1. Feiling, Anthony: Insomnia. The Practitioner, 129:120-192, 1932.
2. Klingman, Robert: The insomniac. Med. Jour. and Rec., 129:683-687, 1929.
3. Solomon, Meyer: Med. Jour. and Rec., 138:22-26, (July) 1933.

ATTEMPTED SUICIDE*

Investigation of One Annual Series in the Minneapolis General Hospital

JOSEPH C. MICHAEL, M.D., and BURTON P. GRIMES, M.D.
Minneapolis

THE problem of suicide has received much attention throughout the ages of human history. A particular interest attaches to the unsuccessful suicide. It is our purpose to report on a fairly representative group of patients seen in a municipal hospital from July 1, 1932, to June 30, 1933. During that period this hospital received routinely the emergency cases transported by ambulance, and also many who were brought to the hospital by other conveyances. We shall append a note on the successful suicides in Hennepin County for the same period. This area includes the municipality plus approximately an additional 100,000 county population.

The attempt to inflict injury upon or destruction of the self signifies a special type of psychopathology. Causes may be grouped generally as: (a) precipitating, and (b) primary. Though the social group habits and external conditions have a positive or negative influence, the culmination in the attempt at suicide is preceded by personality disturbances, by inner conflicts of varying types and periods of duration. The external conditions lend themselves quite readily to outlining, but the more primary personality problems are, as is to be expected in so many psychiatric conditions, of a highly individual character. And these are ascertained only by objective study of the individual's life experiences, and of his subjectivities and responses thereto. Our series of cases includes the patients who died following their reception in the hospital.

Precipitating Causes

Tables I to XI are presented to indicate the precipitating causes.

Referring to Table I, we were unable to subdivide the white race group. Conventional suicide statistics reveal that the north European or Germanic races show a higher rate than the Latin and Celtic group. The rate for the colored races in the United States is one-third of that for the white. Descendants of European immigrants in this country tend to show a higher rate than their forbears.

The youngest in our group was seventeen years of age. The twenties and thirties show the highest incidence. In the successful suicide series the rate rises steadily from the teens upward, though for the female sex the rise after the third decade is not as significant as it is for males.

Religion has an unquestioned influence upon the suicide rate. The Irish Free State is at the bottom of the list for successful suicides for 1930 with a rate of 2.8 for 100,000 population. Spain follows with 3.5, Italy with 9.6. Traditionally Catholics and Jews have the lower rates. In our series of attempted suicides the proportion for Catholics seems relatively high. The fact that a number of these patients had actually made no serious attempt to kill themselves, as we shall note below, no doubt explains this higher percentage.

The factor of occupation presents no striking situation.

Approximately one-half of our group show either unemployment or inadequate employment. Undoubtedly this factor is a precipitating cause of some significance. Yet Table X, presenting incidence for twelve successive months when our economic situation and employment fluctuated most seriously, indicates little confirmation.

In considering the methods employed we find, as one would naturally suspect, the agents utilized to be those that are most readily available in an urban home. Domestic gas and lysol head the list. One naturally is tempted to speculate upon the question, how many more in our series would have died had they had greater opportunity to seize more lethal agents in their moments of emotional distress?

Though the list for previous attempts may understate the real facts because of expected designs to concealment, it is nevertheless our striking observation that so many of our attempted

---

*From the Minneapolis General Hospital and the Division of Neurology and Psychiatry, Medical School, University of Minnesota. Presented before the Minnesota Society of Neurology and Psychiatry at the annual meeting of the Minnesota State Medical Association, July 16, 1934.

TABLE I. RACE

White	114
Black	6
Porto Rican	1
Yellow	1

TABLE II. SEX

Male	55
Female	67

TABLE III. AGE

	Male	Female	Total
15 to 20 years	2	6	8
20 to 25 years	7	18	25
25 to 30 years	7	18	25
30 to 35 years	8	12	20
35 to 40 years	5	9	14
40 to 45 years	5	1	6
45 to 50 years	5	0	5
50 to 55 years	4	2	6
55 to 60 years	5	1	6
60 to 65 years	5	0	5
65 to 70 years	2	0	2

TABLE IV. CIVIC STATUS

	Single	Married	Widowed	Divorced	Estranged
Male	22	26	4	2	1
Female	21	38	1	5	2
Total	43	64	5	7	3

TABLE V. RELIGIONS

Protestant	68
Catholic	40
Jewish	3
Unknown	11

TABLE VI. OCCUPATION

	Male	Female	Total
Housewives	0	43	43
Laborers	22	0	22
Clerks	2	3	5
No Occupation	3	6	9
Maids	0	6	6
Waitresses	0	4	4
Cooks	2	1	3
Salesmen	2	0	2
Artists (Com'l)	2	0	2
Policemen	2	0	2
Teacher	0	1	1
Minister	1	0	1
Stenographer	0	1	1
Craftsmen (Mechanics, Engrs., Electricians, etc.)	11	0	11
Student	0	1	1
Miscellaneous	7	1	8
Unknown	1	0	1

suicides undergo the experience in such a singular way. To learn of subsequent attempted or successful self-destruction is quite exceptional.

Seasonal influence corresponds roughly to that given in tables for successful suicides. The late spring months tend to show higher incidence, and, as to time of day, the early and late evening hours are those when attempts tend to be most frequent.

Primary Causes

Suicide is not necessarily a sign that the person was mentally ill. However, the majority of attempts at self-destruction occur in individuals who are emotionally depressed or who manifest impulsive anxiety. When the patient is interviewed following an attempt he will, of course, excuse himself. His rationalization may at first mislead; the deeper conflicts tend not to be touched upon except when more prolonged study is undertaken. This study is not always possible in a large public hospital service for various reasons.

We should bear in mind that in this patient group, as is the case in so many reactive psychic disorders, there is a complexity of causal relationships. Table XII indicates motives, some of which were readily volunteered, others not. Difficulties and stresses involved in the love life, while admittedly presented in high incidence, are nevertheless intimately bound up with alcoholism, cruelty by the spouse, insufficient income, unemployment, poverty, unwholesome familial and communal attitudes, personality liabilities of the psychopathic constitution type, stressful individual experiences, and bodily diseases or defects.

Fully one-half of our series presented emotional conflicts in personalities indicating no major disorder, or defect. In addition to planned suicide, we note in a group of patients that in their moments of severe emotional panic the turning on of gas, grabbing the lysol bottle, or what not, is for them their quite transitory hope of relief from excessive internal tension. And then, a third group are, it appears, not sincere in their attempt at self injury; rather they stage a drama for the purpose of gaining attention which has hitherto been denied them. These group

TABLE VII. EMPLOYMENT STATUS

	Male					Female					Total
	S.	M.	W.	D.	E.	S.	M.	W.	D.	E.	
Employed	3	4	1	1	1	9	1		5		25
Employed Part Time	1	1				2					4
Unemployed	13	13	2	1		5			1	2	37
Never Employed	2					2					4
Inadequate Income	1	3				2	1				7
No Information	3	4	1				3				11
Husband Employed						2	23				25
Husband Unemployed							7				7
Widow Pensioned							1	1			2

TABLE VIII. METHODS

	Male	Female	Total
Carbon Monoxide (Domestic Gas)	11	15	26
Lysol	5	16	21
Gun	12	4	16
Iodine	5	6	11
Bichloride Mercury	4	4	8
Leaping	4	1	5
Potass. Permanganate	0	6	6
Veronal	1	5	6
Knife	3	0	3
Razor	2	2	4
Rat Poison	2	0	2
Drowning	1	1	2
Automobile	1	0	1
Rubbing Alcohol	0	1	1
Paris Green	0	1	1
Chloral Hydrate	1	0	1
Acid Salicylic	0	1	1
Luminal Poisoning	0	1	1
Hanging	1	0	1
Liquid Ammonia	0	1	1
Gas and Drowning	1	0	1
Camphophenique	0	1	1
Gun and Hammer	0	1	1
Formaldehyde and $HgCl_2$	1	0	1

TABLE IX. PREVIOUS ATTEMPTS

	Male	Female	Total
Second Attempt			
Single	2	1	3
Married	0	1	1
Third Attempt			
Married	1	0	1
Fourth Attempt			
Divorced	0	1	1

TABLE X. TIME OF YEAR

		Male	Female	Total
July	1932	4	6	10
August	"	6	3	9
September	"	5	9	14
October	"	2	5	7
November	"	4	3	7
December	"	2	3	5
January	1933	4	8	12
February	"	5	3	8
March	"	9	5	14
April	"	3	5	8
May	"	5	11	16
June	"	6	6	12

TABLE XI. TIME OF DAY

A. M.		P. M.	
1:00	5	1:00	6
2:00	3	2:00	4
3:00	5	3:00	5
4:00	3	4:00	5
5:00	3	5:00	2
6:00	3	6:00	1
7:00	0	7:00	5
8:00	4	8:00	8
9:00	0	9:00	4
10:00	2	10:00	9
11:00	3	11:00	7
12:00	5	12:00	6

"During morning"	4
"During evening"	14
"Hour unknown"	6

TABLE XII. MOTIVES ASCERTAINED

	Male					Female					Total
	S.	M.	W.	D.	E.	S.	M.	W.	D.	E.	
Health	1	5				2	5				13
Health and finances	3	3					1				7
Health and relatives		1									1
Disinterested boy						4					4
Disinterested girl	2										2
Love affair with married man						4					4
Quarrel with lover							1				1
Domestic and sex troubles		1					4				5
Disinterested husband							9				9
Disinterested wife		2									2
Cruelty and liquor							6		1		7
Cruelty and nonsupport							3				3
Desertion by wife					1						1
Quarreling among children over pension								1			1
Chronic alcoholism						1	2		1		4
Accused of theft						1					1
Money stolen		1									1
Attacked 3 months prior						1					1
Mother abusive						1					1
Father (Incest)						1					1
Girls unattracted to him	1										1
Employed only part time	1	1				2					4
Unemployed	9	7	2	1		2	2		1	2	26
Insufficient Income	2	1	1			1	1				6
Reason unknown	3	4	1	1		1	2		2		14
Husband not employed							2				2

TABLE XIII. PSYCHIATRIC STATES

		Per Cent
1. Psychoses		29.5
(a) Affective Psychoses	8	
(b) Toxic Psychoses	17	
(c) Dementia Paralytica	1	
(d) Traumatic Psychoses	2	
(e) Psychosis with other organic brain disease	1	
(f) Psychosis with other somatic diseases	2	
(g) Psychosis, types inadequately determined	5	
2. Psychoneuroses		50
(The several types of minor reactive personality disorders)	61	
3. Epilepsy	2	1.6
4. Constitutional static defect states		9.8
(a) Psychopathic personality types	9	
(b) Feeblemindedness	3	
5. Undiagnosed	11	9

TABLE XIV. ASSOCIATED DISEASE AND ADDICTIONS

	Male	Female	Total
Alcoholism	10	22	32
Lues	3	7	10
Drugs	0	1	1

TABLE XV. OUTCOME

	Male	Female	Total
Died	14	3	17
Committed to State Hospital	2	1	3
Discharged to family or others	39	63	102

divisions are not always clear-cut, to be sure. Immediately after regaining consciousness, or upon feeling the throat burning, or a generalized malaise, beholding the injury inflicted, the patient not uncommonly has a wholly different attitude toward life. Here we have the nonpsychotic group, who, however, do present personality liabilities in their capacity for emotional control, or some intellectual limitations, et cetera. Case reports will illustrate.

The more pronounced mind disorders or defect states are listed in Table XIII.

Associated Diseases

Thirty-four of our patients were judged to have been under the influence of alcohol during their attempts at self-injury. In some instances the alcoholic state is but a part of the suicide plan. The incidence of syphilis and drugs noted in Table XII is not high.

Outcome

The disposition of our patients noted in Table XV indicates that seventeen died at varying intervals following their admission to the hospital. These and the small number transferred to state institutions represent those who had the more major types of psychic disorder. Several others were advised to continue institutional care, but their kin preferred to receive them in their homes. The large remaining group returned to their former environments, some of them continuing to attend the out-patient clinic. We know that with but few exceptions these patients have made quite satisfactory adjustments.

Reports of Illustrative Cases

Minor Reactive Personality Disorder

Case 1. Female, aged twenty-two, single, domestic, Protestant, native American. Brought to the hospital July 8, 1932, at 1:15 p. m., with the history that she took some permanganate tablets. The stomach was immediately emptied and the patient was sent home. The next day she had pain on swallowing, epigastric distress, and a full feeling in the chest. Thereupon she presented herself for admission. She related that she was infatuated with a married man as well as also with another man. She preferred the former but he had recently written her that he could not see her any more. Furthermore, she had contracted gonorrhea five years ago which was not treated adequately. Fearing she could not look forward to marriage, she planned to commit suicide. After an uneventful course of five days in the hospital, she was discharged.

Minor Reactive Personality Disorder

Case 2. Female, aged twenty-one, married four years, housewife, Protestant, Porto Rico-American, eight and one-half months pregnant. She is said to have always been quite normal except for a tendency to temper display at trivial provocations. Completed second year of high school in New York. Her married life has been happy except that she contracted gonorrhea from her husband soon after their marriage, and that two days ago she found a note from a woman in her husband's coat pocket. Though there was otherwise no cause to doubt his loyalty, not long after his return to work in a neighboring town, she began to brood. The landlady smelled gas and had patient removed to the hospital, where her course was uneventful. No other signs of personality impairment were evident.

Minor Reactive Personality Disorder

Case 3. Female, aged twenty-five, single, cook, employed, Protestant, born in Sweden and resident here for four years. Familial disease trends denied. She had been in love with a man for one year and became pregnant three months prior to her admission to the hospital. She alleged that she was confined to bed for a week with high fever, and other symptoms of flu, but recovered sufficiently so that she was able to return to her place of work. However, the next day there she went through an abortion, with much bleeding. She was confined to bed two days. Her lover to whom she was to be married announced suddenly he was through. On the day following she walked to the drug store nearby, asked for pills with which she could kill her sick dog. She was given blue tablets, and while on her walk away from the store, she swallowed one tablet. She vomited five minutes later. The legs seemed to give way, and she was helped to her lodgings. One hour later her lover found a note written to him by the patient saying that she intended to take poison, etc. Except that in the hospital she felt lonesome for her family, she presented no concerns other than those aroused directly by the sudden change in the attitude of her lover. She left the hospital feeling well, though saying that if the man would not ask her to marry him she would try suicide again.

Psychopathic Constitution

Case 4. Male, aged thirty-two, widowed for one year, unemployed chef, Protestant, nativity unknown, had been a patient at the University Hospital because of alleged colds and gastric complaints until the very day of his admission to the General Hospital. The man had called a woman to drive him from the hospital to his home. There this certain woman and a friend of hers prepared some warm milk to relieve patient's stomach complaints. Without any warning he became enraged. He locked the door, and, seizing a knife, stabbed the woman who befriended him and thereupon himself in the abdomen. He was found in an unconscious state, was operated upon unsuccessfully and died. Many questions in connection with this case remain unanswered but the sudden onset of rage with the homicidal as well as suicidal acts stimulate our interest.

Feeblemindedness

Case 5. Female, aged twenty-nine, single, not employed, Catholic, American, feebleminded (moron) was threatened three months ago by assault on the part of an elderly man known to her as an old friend. This aroused her fears so that she could not sleep at night unless she kept her cheek next to the cheek of her mother. She took a tablespoonful of Paris Green. An hour later she was received at the hospital. She died eighteen hours following the ingestion of the poison with suicidal intent.

Psychopathic Constitution

Case 6. Peculiar behavior since early childhood. History of repeated conduct deviation. Her mother died when patient was two, and her father died when she was fourteen. She was reared in a Montana town of 200. The girl was disciplined very strictly and was always disagreeing with her guardians. She could not go with boys, and had no social life without her parents. She graduated from High School at seventeen years. She came to Minneapolis, where she found it equally hard to please her sister and brother-in-law. One evening a man who came to see the mother of her brother-in-law, forced sexual intercourse upon her, which resulted in pelvic inflammation. Pains continued in back, et cetera, and soon suicidal ideas developed. No other sex irregularities admitted.

On the third day in the Gynecological Ward, patient drank half an ounce of rubbing alcohol. She told the nurse of this at once. The stomach was pumped out. She became noisy, tried self-injury by striking her body, and then shrieked. Thereupon restraints had to be applied until she was transferred to the psychopathic department, where she still spoke of a desire to commit suicide. Refused to eat for three days. Intellectually unimpaired. Transfer to Hennepin County School at Glen Lake was advised. Ultimate outlook regarded as not very favorable.

Acute Alcoholism, Chronic Morphine Addiction and Attempted Suicide

Case 7. Married man, aged forty-one, World War Veteran receiving $64 compensation because of a previous diagnosis of tuberculosis. No symptoms of tuberculosis when examined. Admitted to the hospital in the custody of the police; very noisy, shouting loudly, abusive. Has been drinking steadily for the past three days. A recently incurred lacerated wound of left wrist was alleged by him to have been caused by an accidental fall, though later he admitted cutting himself with a razor blade. His wife, who has attempted to dissuade him from using drugs and drinking, he says is to blame for his unhappiness. In less than twenty-four hours patient became calm, normally rational and co-operative. His general demeanor and intelligence proved then to be above the average.

Hysteria and Attempted Suicide

Case 8. A young, single, obese woman, aged twenty-three, transferred from the University Hospital where under observation for suspected brain tumor, had made attempts to hang herself to the bedpost, then to drown herself by immersing her head in the wash basin, and on another occasion to jump out of the window. She had had an abortion performed two months previously. Following admission to the General Hospital, it was noted that there were alternating periods of apparent psychic normality and delirium. She had some convulsive seizures diagnosed by a physician formerly as "epileptic fits." At intervals she was noted to scratch her face with her fingernails until bleeding was evident. Hallucinatory productions at times were dramatic. She could see her lover and wanted to kill him. Then she described seeing the grotesque features of the fetus which, after its delivery, was shown to her by the abortionist. Within two weeks the patient became more coöperative, she conversed with other patients and worked for and with them. However, periods of hysterical type of consciousness impairment and behavior did recur. These gradually became less and less frequent, and less pronounced in degree so that discharge to her home after six weeks of management in the psychopathic department could be advised. The girl had been reared and had in the main steadily adhered to a continent moral code. Readjustment is naturally not easy. The case presents a wealth of psychopathologic material.

Successful Suicides in Hennepin County

During the period from July 1, 1932, to June 30, 1933, a total of 134 people died by their own hand. Of that group sixteen were treated at the General Hospital prior to their death. The males outnumbered the females three to one. The commonest methods employed were in the order of frequency as follows: (1) gas; (2) gun shot; (3) hanging; (4) drowning.

Comments on Etiologic Viewpoints

Suicide is a problem in psychic pathology which brings out two points of view, that of the individual, and the sociologic. These would appear as ever conflicting with each other. Some authors tend to explain suicide in terms of one or the other of these categories. Many sociologists on the one hand reject the work of individual analysis and dwell exclusively on factors that have to do with environmental influences, group attitudes, conventions and stresses. These writers assume a sort of a fixed incidence rate of unstable personalities and explain variations in the number of suicidal attempts in terms that have to do with social changes. Some psychiatrists have at times leaned rather heavily in this direction. Others, however, take what seems a more logical point of view; to them, in the words of Dr. Charles Blondell, "all that one may say in favor of the theory of the social causation of suicide is that among many psychopaths these causes are like the last drop of water which causes a vase to overflow. The vase has already been full with a predisposition towards impulsive anxiety without which there would be no suicide."

The psychoanalyst has etiologic viewpoints which are concerned quite exclusively with individual factors. Freud maintains that the tendency to self-destruction is present, to a certain degree, in many more persons than those who bring it to completion. To find the mental energy to kill himself, the individual is in reality motivated to kill an object with which he has identified himself. The death wish unconsciously directed against an object (another person) becomes, by curious mental mechanisms, directed against himself or merely some part of himself. And some bodily stigmata of hysteria are indeed regarded as psychic or unconscious suicidal attempt upon a part of himself only.

After all, the two viewpoints may be regarded as quite complementary to each other, with the individual factors (*i.e.*, the psychiatric — the medical) as fundamental, and the social factors as contributory. The sociologic investigation may complete the psychopathologic but the former cannot replace the latter.

MULTIPLE AREAS OF CUTANEOUS GANGRENE FOLLOWING SCARLET FEVER*

With Report of Case

S. E. SWEITZER, M.D., and CARL W. LAYMON, M.D.
Minneapolis

MULTIPLE areas of cutaneous gangrene constitute, fortunately, an infrequent complication of scarlet fever, but nevertheless one which presents a difficult therapeutic problem. This feature of the disease is given but scant mention in the current textbooks, and is reported only rarely in the literature.

In discussing the condition, Fedders[1] divided post-scarlatinal gangrene of the skin into the following general types:

1. Gangrene of a localized area, most commonly a portion of or an entire extremity due either to thrombosis or embolism.
2. Gangrene due to a septic process surrounding underlying lymph nodes (as a rule in the cervical region) or other structures.
3. Rarely gangrene of the Raynaud type, which may accompany other common infections as well as scarlet fever.
4. Isolated areas of necrosis of the skin not decubital in nature, and not fitting into any of the above groups. This division includes the cases of dermatitis gangrenosa infantum (ecthyma gangrenosum), which rarely occurs as a complication of scarlet fever, and which is seen more frequently in conjunction with vaccination, varicella, and other pustular eruptions in infants.

In his report, Fedders reviewed eight cases from the literature and described one of his own which fit into group four. Fedders' case was characterized by severe cutaneous necroses but with very little disturbance of the general condition. The lesions were generalized and symmetrical, and proved to be the sole complication of the disease. The blood picture spoke against a septic process and an increased sensitivity to scarlet fever toxin was not present. The lesions began as extravasations of blood into the epidermia followed by necrosis within a week. However, in some of the hemorrhagic lesions, necrosis was either very superficial or did not follow at all. No evidences of blood dyscrasia could be found. Fedders was unable to determine any definite etiologic factor, although various possibilities were considered such as angiospasm in the damaged tissues, local tissue asphyxia, post-infection thrombosis or embolism, disturbances of innervation, etc.

Pasachoff and Sobel,[3] in 1932, also reported a case of dermatitis gangrenosa infantum which occurred in the course of scarlet fever. The patient was a boy, five years of age, who developed a pustular eruption three weeks following the onset of scarlet fever. Before the appearance of the complicating eruption, the temperature had been normal for a week. The pustules, which were present only on the face and extremities, progressed to form shallow irregular, gangrenous ulcers which healed with scarring in three months. Staphylococci were recovered from the ulcers. The authors believed that the etiologic factors were multiple, perhaps bacterial or toxic, and that the lesions were possibly a clinical manifestation of increased local cutaneous reactivity to bacterial products.

---

*From the Division of Dermatology, University of Minnesota, H. E. Michelson, M.D., Director, and the Dermatology Service, Minneapolis General Hospital, S. E. Sweitzer, M.D., Chief.

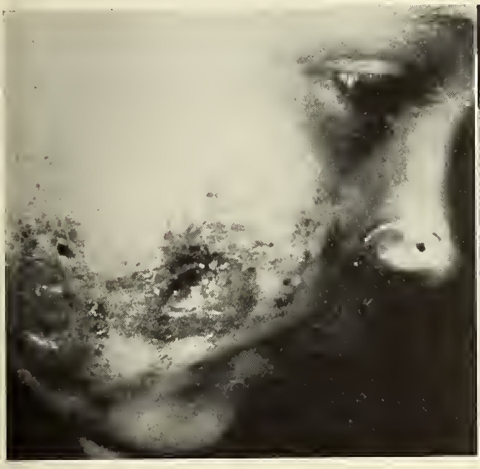


Fig. 1. Gangrenous lesions on cheek.

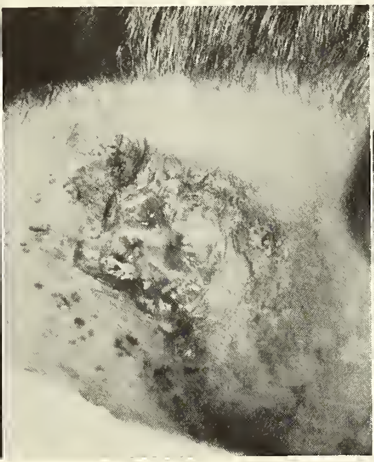


Fig. 2. Gangrenous lesions on neck.

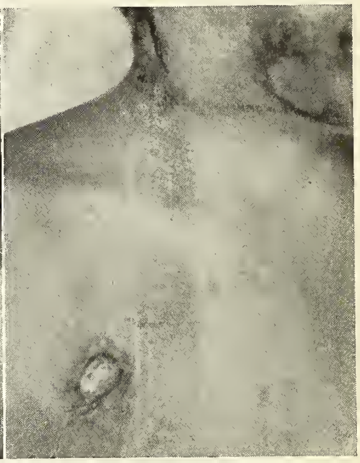


Fig. 3. Gangrenous lesions on chest.

Huebner[2] reported a case of gangrene of the skin in a case of scarlet fever which was complicated by septic arthritis. We feel that this case should be placed in group two. The patient developed bilateral cervical adenitis and arthritis of the knees, elbows, and fingers approximately three weeks after the onset of definite scarlet fever. The skin overlying the affected joints became red and edematous coincident with the onset of the pain in the joints. A week later the skin over the right elbow became black and definite gangrene developed, covering an area which measured nine by eight centimeters. The ulcer finally healed after a period of five months. Huebner, at the time, was unable to find a similar case and stated that most examples of cutaneous gangrene in scarlet fever occurred following emboli or secondary to suppurating nodes in the cervical region. He believed that the gangrene in his patient was neither embolic, bacterial, nor decubital in nature but that the chief etiologic factor was a vasomotor disturbance of the skin brought about by the severe accompanying arthritis and edema.

We believe that the case which we are reporting should also be classified in group two: gangrene of the skin secondary to an underlying septic process. There were definite differences between this case and those which have been reported under the title of dermatitis gangrenosa infantum, in which there is a generalized pustular eruption leading to multiple gangrenous areas.

Report of Case

History.—The patient, a white boy, six years of age, was admitted to the Minneapolis General Hospital on May 14, 1932. His mother stated that he had contracted a cold two weeks previously and that on May 9 she observed that he looked and felt feverish. The following day a generalized eruption appeared, which was diagnosed urticaria by the family physician. On May 11, the patient complained of a severe sore throat and the nodes on both sides of the neck became greatly enlarged. The condition, as a whole, increased in severity until the time of admission.

The mother stated that the tonsils and adenoids had been removed three years previously and that the only contagious disease which the boy had had was varicella. The teeth had always been in poor condition. The history by systems was, otherwise, essentially negative.

Examination.—The examination at the time of admission showed that the temperature (mouth) was

104.6° Fahrenheit, pulse 120 and respirations 32. Examination of the ears by means of the otoscope showed no evidences of pathology. There was a profuse mucopurulent nasal discharge and the tongue appeared heavily coated posteriorly, while the anterior third was bright red due to desquamation. A diffuse pharyngitis and peritonsillitis of severe grade was noted. The cervical lymph nodes were tremendously enlarged on both sides of the neck. The skin presented the typical erythematous, punctiform exanthem of scarlet fever.

Laboratory data and course.—The laboratory findings at the time of admission were as follows:

Urine: slight amount of albumin and an occasional red blood cell on microscopic examination.

Blood: hemoglobin, 85 (Sahli); red blood cells, 4,080,000; leukocytes, 16,000.

There were no important variations in the above findings during this period of hospitalization.

The cervical lymph nodes remained swollen and extremely painful until June 24, 1932. At this time, fluctuation was found and an incision was made on the left side of the neck parallel to the sternocleidomastoid muscle and 90 c.c. of pus spurted out. Previous to this operation, an alveolar abscess of the right, lower, fourth tooth was found and on June 16 the tooth was extracted. The procedure was followed by the formation of two small abscesses in the mid-portion of the right cheek. These were incised and drained on July 1.

The skin surrounding each of the points of surgical incision became intensely red and edematous within a few days after the operative procedures. Within a week these reddened areas, which varied from 2 to 5 centimeters in diameter, became more indurated and turned black, later sloughing out to form deep, gangrenous ulcers, which were undermined at the borders and emitted a profuse ropy, purulent discharge, originating chiefly from the underlying suppurating process. Thus there were two such areas of necrosis on the right cheek and one on the neck, posterior to the right ear. All were similar in appearance and varied only in size.

On July 7, 1932, a furuncle appeared on the right side of the anterior chest wall at the level of the axilla. The lesion, however, presented no unusual appearance so the patient was discharged and advised to apply warm, wet dressings, and to report to the out-patient department for further care. At this time the lesions on the face and neck seemed to be improving.

During the following month none of the lesions showed any tendency to heal, and, contrary to expectations, drainage increased and the general condition of the patient became worse. He was readmitted on August 15, 1932.

During the second period of hospitalization, smears and cultures from the necrotic areas showed a variety of bacteria, including hemolytic streptococci, staphylococcus aureus and Gram-positive diplococci. The lesion on the chest which, apparently, began as an ordinary furuncle now resembled the areas of necrosis on the face and neck. The general condition of the patient improved immediately following admission to the hospital. The temperature remained within one degree of normal and the blood and urine showed no significant changes from August until December, 1932, when he was discharged.

The chief problem was that of therapy. On August 25, debridement of all the necrotic tissue in the four gangrenous areas was carried out. This was followed by antiseptic wet dressings, repeated skin grafts, ultra violet light, and hemolytic streptococcic vaccine in increasing dosage at five day intervals. The condition proved extremely refractory to all forms of treatment and healing took place slowly. Early in December, 1932, drainage from all the lesions stopped and epithelialization of the ulcers became more rapid. At the time of discharge (December 17, 1932) the lesion on the chest had healed completely and the others were progressing satisfactorily. The final healing of the lesions on the face and neck, completed early in January, 1933, resulted in the formation of heavy, red scars which have since become much less noticeable by assuming the color of normal skin. At the present time the patient is in good health.

Comment

There are several features pertaining to this type of case which make the condition worthy of note. As has been previously mentioned, actual gangrene of the skin occurring in the course of scarlet fever is a rarity, even though such a complication as suppurative adenitis is present. The transition of an ordinary furuncle into an area of frank gangrene suggests that, in certain uncommon instances, the tissues of the debilitated patient, with scarlet fever, are predisposed to gangrenous processes much in the same manner as those of the diabetic.

Striking, too, is the extreme torpidity of reaction of the tissues of these patients. The delayed or complete lack of tendency toward healing is a feature which has been emphasized consistently in the previous reports of similar cases. Change in the lesions is measured in months rather than days or weeks, hence this should be considered in giving a prognosis. Such necrotic ulcers are notably refractory to therapy regardless of type.

We believe that the etiology in this case was most likely bacterial infection directly into previously injured tissues. Smears and cultures of ulcers of this type, however, are of little value due to the presence of various secondary invaders. In this instance, hemolytic streptococci were found most consistently and almost exclusively in some of the smears. It seems most logical to believe that these organisms played the greatest rôle in the gangrenous process.

Summary

An odd case of gangrene of the skin occurring n the course of scarlet fever is reported, charterized by necrotic ulcers secondary to underlyng septic processes. The lesions were extremely bstinate to treatment and required a period of pproximately seven months for complete healing.

References

1. Fedders, G.: Ein Fall von symmetrischer Hautnekrose bei Scharlach. Jahrb. f. Kinderh., 129:270, 1930.
2. Huebner: Hautgangrän bei Scharlachrheumatoid. Berl. klin. Wchnschr., 45:1345, 1908.
3. Pasachoff, Harry D., and Sobel, Nathan: Dermatitis Gangrænosa Infantum in the course of scarlet fever. Arch. Dermat. and Syph., 26:428, 1932.

CASE REPORTS

OSSIFYING HEMANGIO-ENDOTHELIOMA

ARTHUR N. COLLINS, M.D.
and
GEORGE L. BERDEZ, M.D.
Duluth

The unusual occurrence of a tumor such as we are about to describe warrants its recording in the literature.

The patient, a man aged sixty-nine, a Norwegian machinist, was admitted to the hospital June 18, 1934. He complained of a tumor in the right inguinal region —stating he had first noticed this tumor in 1930. It was then about 1.5 inches in diameter, hard, but neither tender nor painful.

In the winter of 1928 he had slipped on an iron plate in the sidewalk and had fallen striking his right hip. He was not disabled and there was no ecchymosis or apparent bleeding in the right inguinal region. He noticed a little soreness for two or three days but he went on with his work.

During the last six months the mass had been growing larger and it had doubled in size during the last two or three months. During the last few weeks, however, when sitting and bending forward he had noticed soreness. There had been no pain otherwise, no loss of weight and his general health had been good.

On persistent inquiry, the patient finally remembered an incident twelve years ago when he was helping to lift a heavy iron safe. During the effort, he felt a painful strain in the right inguinal region. Following this there was a deep "black and blue" discoloration for a time.

He further stated he had had an "osteomyelitis" of the right femur since he was fifteen years old, the drainage from this process having ceased about five years before admission. Since the cessation of drainage, he had been troubled with rheumatism and sciatica in the right leg.

On examination, the man was large, well built and muscular. General superficial examination was negative except for the tumor in his right groin. This was about three inches long and two inches wide, hard and more or less irregular in outline. It was somewhat movable, though it seemed to be attached deep down. It was not tender to manipulation, and did not shift in position or size during a cough. There was no family history of carcinoma; there were no pigmented moles on the legs or feet. In his work as machinist he did not traumatize the right inguinal region. He stated he would certainly notice anything of the sort if it occurred because the tumor had been present for several years.

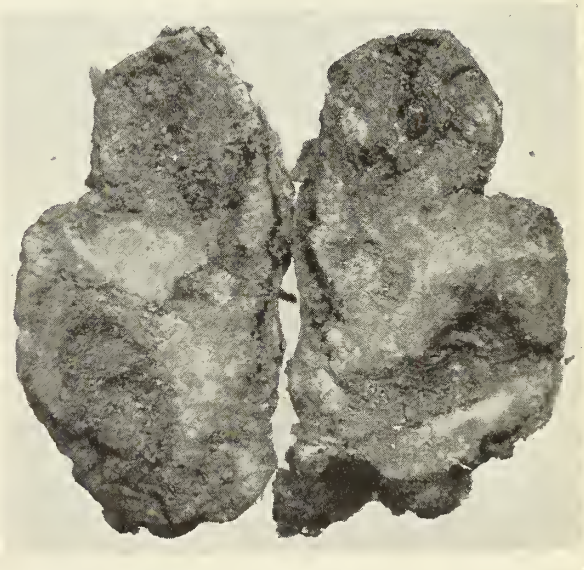


Fig. 1. Photograph of the specimen removed. The light areas show calcification with beginning ossification. The dark areas are the cellular portions.

Roentgenograms showed:
(1) Marked arteriosclerotic blood vessels.
(2) Calcification in the right inguinal region.
(3) No evidence of pathology in the right femur.
(4) Marked hypertrophic osteo-arthritic changes in lumbar spine.
(5) No evidence of previous disease such as tuberculosis or osteomyelitis.

The urine analysis gave negative results and as did the Wassermann test.

On examination of the blood, the hemoglobin was 86 per cent, the red blood count 4,210,000 and the white count 3,500 and 4,200 on two separate occasions. The polymorphonuclears on two separate occasions were 64 and 49 per cent; the lymphocytes 34 and 48 per cent and the eosinophiles 2 and 3 per cent.

On surgical removal the tumor was "shelled" out rather easily, except at the base where there were a few fibrous adhesions to the fascia. The tumor was an elongated but rounded hard nodular mass measuring 11.3x6x6 cm. and weighing 210 grams (Fig. 1). It was irregularly hard in consistency with occasionally softer or almost fluctuating areas and it was surrounded by a rather tough fibrous capsule measuring 0.1 to 0.2 cm. in thickness.

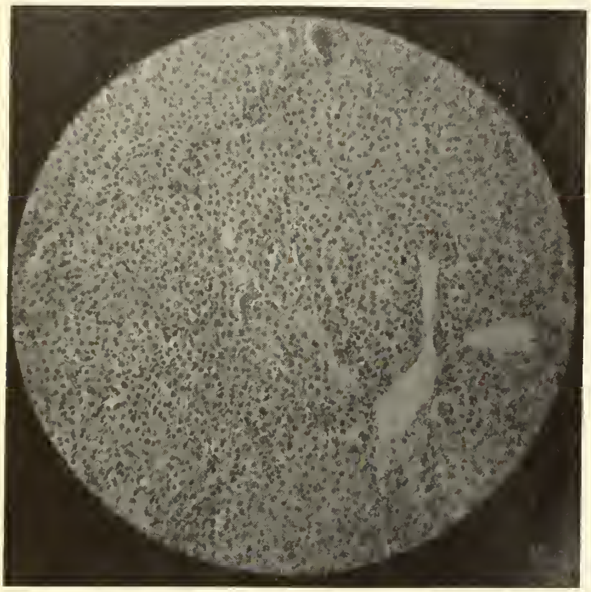


Fig. 2. Microphotograph of the cellular part of the tumor.

Pathology.—A biopsy specimen appeared brownish red in color and friable in consistency; in places calcified. Fragments of a whitish capsule were seen here and there.

Microscopic section (Fig. 2) showed in places, tumor tissue, formed by more or less densely grouped polyhedral elongated or oval cells which often surrounded irregular spaces filled with red blood cells. In other places the tumor cells showed a rosette-like arrangement. Occasionally the cells formed whorls. Several newly formed bony trabeculæ were embedded in the tumor masses, some of the trabeculæ were formed by osteoid substance not yet calcified, others were already quite compact and calcified. The bony trabeculæ showed often a very irregular outline with grooves in which osteoclasts could be seen. The tumor was necrotic in places. There were only a few mitoses and the tumor was regarded as one having a slow rate of growth.

Diagnosis.—Ossifying hemangio-endothelioma of the right inguinal region; malignancy grade I.

In an endothelioma, the cell, according to Ewing, usually retains some distinguishing feature or features which serve as a basis for recognition of the type of growth, *i.e.,* polyhedral, pavement or occasionally cylindrical.

Calcification overtakes many slowly growing endotheliomas, especially the perivascular and psammomatous tumors of the dura. The deposits appear in the cells, stroma and walls of blood vessels. In a subcutaneous tumor of the foot, Perthes found extensive calcification leading eventually to ossification. In a remarkable form of endothelioma of the orbit, Ewing found very extensive deposits of calcified nodules producing a form of osteoid tissue.

Donovan (1932) in Buenos Aires reported a case somewhat similar to the case we are describing. His case showed an ossified hematoma following a football injury.

We have seen our patient several times during the six months since his operation. He is in excellent health. The wound healed well and we can find no sign or symptom of recurrence.

TRAUMATIC ARTERIOVENOUS ANEURYSM OF RIGHT SUPERFICIAL TEMPORAL ARTERY AND VEIN

JOHN J. HOCHFILZER, M.D.

Saint Paul

An arteriovenous aneurysm is an abnormal communication established between the arterial and venous channels; thus, the correct term is arteriovenous fistula. Mount R. Reid, C. L. Callander, G. H. Wakins, and F. Bramman have dealt with this subject extensively and thoroughly, and it would be only repetition on my part to review the literature on this subject. The purpose of this article is to report a case of arteriovenous aneurysm, warranted, I believe, because of its unusual location and etiology.

A young man, eighteen years old, came to the Dispensary of the Ancker Hospital, giving the following history: A year ago, he was in an automobile accident; he was thrown through the windshield of his automobile and suffered several lacerations in the right side of the face and in the thigh; he was immediately brought to the Ancker Hospital, where he received first aid. The lacerations were found rather superficial, except for one over the tragus of the right auricle. All were sutured and the patient was sent home and instructed to see his private physician for the necessary after-care. All wounds healed by first intention.

About one week after the accident, patient noticed a peculiar sensation in front of the right ear, consisting of a beat and then a sizzling sound. Gradually, a swelling in that region was noticeable, which slowly increased in size. At no time did he have any pains, but these sounds became rather annoying.

The physical examination was essentially negative, except for the findings in the temporal-zygomatic region. A vertical scar, two centimeters long, could be seen over the tragus of the right auricle; in front of the tragus, a swelling the size of a walnut was noticeable (Fig. 1). At auscultation over this elevated area, a marked systolic thrill and bruit could be made out. By compressing the right external carotid artery and its branches, below the mandibular angle, all these symptoms disappeared. So our diagnosis was an arteriovenous fistula between the right superficial temporal artery and vein, caused by the deep laceration into the tragus, whereby the temporal artery and vein, being just in front of it, must have been injured.

Nearly all acquired arteriovenous aneurysms are accidental and are made possible by the juxtaposition of arteries and veins of larger caliber, so that a perforating wound can establish direct communication between the two vessels.

According to Reid,[1] the outstanding symptoms of arteriovenous aneurysms are: the vascular bruit heard best over the communication between the two vessels, which may be accompanied by a thrill, due to the passage of a forceful current of arterial blood through a small opening from an area of high pressure to one of low pressure. The veins, which must carry his arterial pressure without an intervening capillary ed, dilate and form large pulsating anastomosing masses, and so cause enlargement of the region involved.

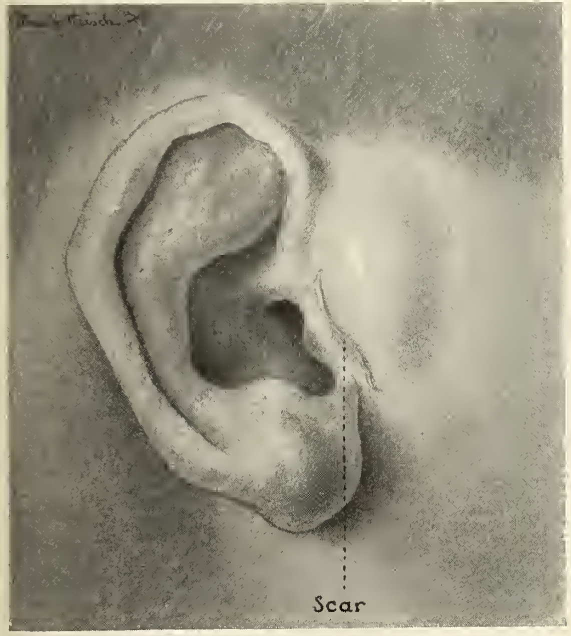


Fig. 1.

If one leaves an arteriovenous aneurysm untreated, several things may occur. A spontaneous healing may take place through the formation of thrombosis in the fistula or aneurysmal sac; a gradual expansion of the sac may finally result in rupture and severe hemorrhage; an infection of the hematoma may occur; finally, out of an arteriovenous aneurysm a truly vascular tumor such as an angio-sarcoma or endothelioma may develop.

The course of treatment of an arteriovenous aneurysm has been more or less standardized. There are only two methods which promise any success, that is, quadruple ligation, or extirpation of the fistula. All other forms of treatment such as compression or injection of coagulating fluids are insufficient. Proximal and distal ligation of the artery only will be a failure for the reason that a well developed collateral circulation will supply the fistula with arterial blood. If a quadruple ligation, that is, proximal and distal ligation of artery and vein, is done, one has to be sure that all branches of the supplying artery are included in the ligation, for the reason before mentioned. Extirpation, if feasible, gives by far the best results according to Reid. The location of the fistula may be such that it cannot be reached, for instance in a case of an intracranial arteriovenous aneurysm.

In our case, the operation was done in two stages: The location of the arteriovenous fistula was assumed to be just at the upper edge of the parotid gland, therefore in very close proximity to the superior branches of the facial nerve. In order to avoid any injury of these structures it was important to keep the operative field as bloodless as possible. Therefore, I ligated first the right external carotid artery just above the point where the lingual artery branches off. At its exposure, I noticed that the dilatation of the temporal vein had extended down into the facial and jugular vein, the latter being at the point of the carotid plexus twice its normal size. Following the ligation of the right external carotid artery, the bruit disappeared and the aneurysmal sac seemed to have become smaller; but this state did not last very long.

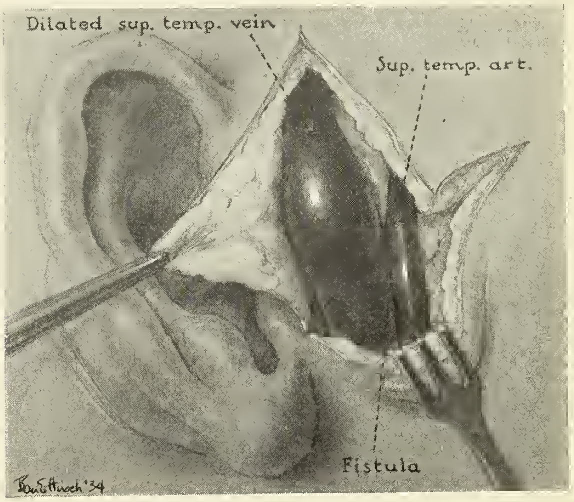


Fig. 2.

A week later the symptoms were the same as previous to the ligation so the second operation was immediately instituted (Fig. 2). A horizontal incision was made at the lower edge of the zygomatic ridge through the skin and parotid masseteric fascia. The upper edge of the parotid gland was visualized and retracted downwards, the dilated temporal vein and its branches were exposed, and finally, after enlarging the incision vertically, the artery came into sight. The topographic relations of temporal artery and vein were reversed in our case, the artery being anterior to the exposed vein, while the reverse is normal. The fistula was also exposed. After ligation of all distal, proximal, arterial and venous branches involved, the fistula was extirpated. Recovery was uneventful and all the symptoms have subsided.

In this case it was again proven that a simple proximal ligation of the main artery is insufficient and should never be attempted as the only course in the treatment of arteriovenous fistula.

Reference

1. Reid, Mont R.: Studies on abnormal arteriovenous communications, acquired and congenital. Arch. Surg., 10:601, 1925.

EDITORIAL

MINNESOTA MEDICINE
Official Journal of the Minnesota State Medical Association
Published by the Association under the direction of its Editing and Publishing Committee

EDITING AND PUBLISHING COMMITTEE
J. T. Christison, Saint Paul A. S. Hamilton, Minneapolis
E. M. Hammes, Saint Paul T. A. Peppard, Minneapolis
Waltman Walters, Rochester

EDITORIAL STAFF
Carl B. Drake, Saint Paul, Editor
W. F. Braasch, Rochester, Assistant Editor
C. A. McKinlay, Minneapolis, Assistant Editor

Annual Subscription—$3.00. Single Copies—$0.25
Foreign Subscriptions—$3.50.

The right is reserved to reject material submitted for editorial or advertising columns. The Editing and Publishing Committee does not hold itself responsible for views expressed either in editorials or other articles when signed by the author.

Classified advertising—five cents a word; minimum charge, $1.00. Remittance should accompany order.

Display advertising rates on request.

Address all communications to Minnesota Medicine, 2642 University Avenue, Saint Paul, or 324 Fourth Avenue South, Minneapolis. Telephones: Nestor 1381 and Dupont 1013.

BUSINESS MANAGER
J. R. Bruce, Saint Paul

Volume 18 MARCH, 1935 Number 3

Medical Solidarity

It has been truly said that there has never been a depression or like calamity in this country from which its people have not been able to rally some benefit.

Threats and rumors, in all their suggested forms of State Medicine, subsidies, contract practice, and lay control of the profession, have been loudly knocking at our doors. But as a foreign war unites our states, so have these threats to our ideals united the medical men throughout the country more firmly than ever before.

Outstanding has been the renewed activity or birth of county medical societies, where they were inactive or non-existent. The getting together of neighboring physicians to discuss their common economic and professional problems has created anew the feeling of good will and cooperation that has too often laid dormant for many years.

Local fee schedules have been adopted, both for the care of the paying patient and the indigent, in keeping with the suggestions of our State Association. A united front has been formed to deal with the many relief measures, often both rapidly and unexpectedly offered to us.

Economically speaking, frequent regular meetings of county medical societies, and special meetings to meet economic emergencies, near to home, with their 100 per cent attendance, is a stronger unit of combat than the infrequent meetings of the larger district societies, often far from home with a resulting poor attendance.

What may be accomplished economically in a district meeting when your neighbor, or competitor if you wish, is not present to voice his problem, offer his solution, or agree to coöperate with the plan in question?

Those counties that have not organized are lacking their strongest weapon—that of a united front of neighboring physicians.

We in Todd county, each willing to coöperate or sacrifice if need be for the common good of the group, enjoy a real feeling of security. Come what may, it will be difficult, indeed, for any lay-controlled group to force any type of plan or legislation upon us that we are not willing to accept.

B. L. Gifford, M.D., *Secretary*
Todd County Medical Society

Editorial Staff Increased

We take pleasure in announcing the appointment by the Editing and Publishing Committee of Dr. C. A. McKinlay, Minneapolis, as Assistant Editor of Minnesota Medicine. The journal, being the property of the Minnesota State Medical Association, is directed by the Editing and Publishing Committee. In addition each section of the state is represented by an Associate Editor. Dr. W. F. Braasch of Rochester, as chairman of the Committee on Medical Economics, is Assistant Editor in charge of the Medical Economics section of the journal. Dr. McKinlay will lend his services in the editing of the journal, but will not have supervision of any special phase of the work.

A. M. A. Delegates Meet

A large and enthusiastic gathering of A. M. A. delegates met in Chicago, February 15 and 16, in special session to consider the following questions:

---

1. Shall or shall not the House of Delegates again declare its opposition to all forms of state medicine, including any form of medical treatment provided, conducted, controlled or subsidized by the federal or by any state government, excepting such service as is provided by the Army, Navy or Public Health Service and such as is necessitated by the control of communicable disease or for the treatment of mental disease or of the indigent sick, and excepting, also, all such other service as may be approved, administered or conducted by local county medical societies and not disapproved by the state medical societies of which they are component parts?
2. What is the attitude of the House of Delegates toward the eleven principles proposed by the Committee on Economic Security as fundamental to any system of sickness insurance to be established by the federal government?
3. Shall or shall not the House of Delegates of the American Medical Association reaffirm its opposition to the principle of federal subsidies to individual states in relationship to the provision of medical service?
4. Will the House of Delegates express its position relative to that provision of the Wagner bill which places the control of medical affairs in the Department of Labor under a non-medical special board?
5. What attitude shall the House of Delegates take relative to the proposed sickness insurance legislation in the individual states as represented by the Epstein bill of the American Association for Social Security?
6. How may the American Medical Association initiate plans for still further improving the quality of medical service and for obtaining better distribution of medical service for all the people?

After two days of animated discussion of the problems presented, the House of Delegates adopted unanimously the following report:

Report of the Reference Committee
Special Session of House of Delegates
February 15 and 16, 1935

Your reference committee, believing that regimentation of the medical profession and lay control of medical practice will be fatal to medical progress and inevitably lower the quality of medical service now available to the American people, condemns unreservedly all propaganda, legislation or political manipulation leading to these ends.

Your reference committee has given careful consideration to the record by the Board of Trustees of the previous actions of this House of Delegates concerning sickness insurance and organized medical care and to the account of the measures taken by the Board of Trustees and the officials of the Association to present this point of view to the government and to the people.

The American Medical Association, embracing in its membership some 100,000 of the physicians of the United States, is by far the largest medical organization in this country. The House of Delegates would point out that the American Medical Association is the only medical organization open to all reputable physicians and established on truly democratic principles, and that this House of Delegates, as constituted, is the only body truly representative of the medical profession.

The House of Delegates commends the Board of Trustees and the officers of the Association for their efforts in presenting correctly, maintaining and promoting the policies and principles, heretofore established by this body.

The primary considerations of the physicians constituting the American Medical Association are the welfare of the people, the preservation of their health and their care in sickness, the advancement of medical science, the improvement of medical care, and the provision of adequate medical service to all the people. These physicians are the only body in the United States qualified by experience and training to guide and suitably control plans for the provision of medical care. The fact that the quality of medical service to the people of the United States today is better than that of any other country in the world is evidence of the extent to which the American medical profession has fulfilled its obligations.

The House of Delegates of the American Medical Association reaffirms its opposition to all forms of compulsory sickness insurance whether administered by the Federal government, the governments of the individual states or by any individual industry, community or similar body. It reaffirms, also, its encouragement to local medical organizations to establish plans for the provision of adequate medical service for all of the people, adjusted to present economic conditions, by voluntary budgeting to meet the costs of illness.

The medical profession has given of its utmost to the American people, not only in this put in every previous emergency. It has never required compulsion but has always volunteered its services in anticipation of their need.

The Committee on Economic Security, appointed by the President of the United States, presented in a preliminary report to Congress on January 17 eleven principles which that Committee considered fundamental to a proposed plan of compulsory health insurance. The House of Delegates is glad to recognize that some of the fundamental considerations for an adequate, reliable and safe medical service established by the medical profession through years of experience in medical practice are found by the Committee to be essential to its own plans.

However, so many inconsistencies and incompatibilities are apparent in the report of the President's Committee on Economic Security thus far presented that many more facts and details are necessary for a proper consideration.

The House of Delegates recognizes the necessity under conditions of emergency for federal aid in meeting basic needs of the indigent; it deprecates, however, any provision whereby federal subsidies for medical services are administered and controlled by a lay bureau. While the desirability of adequate medical service for crippled children and for the preservation of child and maternal health is beyond question, the House of Delegates deplores and protests those sections of the Wagner Bill which place in the Children's Bureau of the Department of Labor the responsibility for the administration of funds for these purposes.

The House of Delegates condemns as pernicious that section of the Wagner Bill which creates a social insurance board without specification of the character of its personnel to administer functions essentially medical in character and demanding technical knowledge not available to those without medical training.

The so-called Epstein Bill, proposed by the American Association for Social Security now being promoted with propaganda in the individual states, is a vicious, deceptive, dangerous and demoralizing measure. An analysis of this proposed law has been published by the

American Medical Association. It introduces such hazardous principles as multiple taxation, inordinate costs, extravagant administration and an inevitable trend toward social and financial bankruptcy.

The committee has studied this matter from a broad standpoint, considering many plans submitted by the Bureau of Medical Economics as well as those conveyed in resolutions from the floor of the House of Delegates. It reiterates the fact that there is no model plan which is a cure-all for the social ills any more than there is a panacea for the physical ills that affect mankind. There are now more than 150 plans for medical service undergoing study and trial in various communities in the United States. Your Bureau of Medical Economics has studied these plans and is now ready and willing to advise medical societies in the creation and operation of such plans. The plans developed by the Bureau of Medical Economics will serve the people of the community in the prevention of disease, the maintenance of health and with curative care in illness. They must at the same time meet apparent economic factors and protect the public welfare by safeguarding to the medical profession the functions of control of medical standards and the continued advancement of medical educational requirements. They must not destroy that initiative which is vital to the highest type of medical service.

In the establishment of all such plans, county medical societies must be guided by the ten fundamental principles adopted by this House of Delegates at the annual session in June, 1934. The House of Delegates would again emphasize particularly the necessity for separate provision for hospital facilities and the physician's services. Payment for medical service, whether by prepayment plans, installment purchase or so-called voluntary hospital insurance plans, must hold, as absolutely distinct, remuneration for hospital care on the one hand and the individual, personal, scientific ministrations of the physician on the other.

Your Reference Committee suggests that the Board of Trustees request the Bureau of Medical Economics to study further the plans now existing and such as may develop, with special reference to the way in which they meet the needs of their communities, to the costs of operation, to the quality of service rendered, the effects of such service on the medical profession, the applicability to rural, village, urban and industrial population, and to develop for presentation at the meeting of the American Medical Association in June model skeleton plans adapted to the needs of populations of various types.

(Signed) Dr. Harry H. Wilson, *Chairman*, California
Dr. Warren F. Draper, Virginia
Dr. E. F. Cody, Massachusetts
Dr. E. H. Carey, Texas
Dr. N. B. Van Etten, New York
Dr. F. S. Crockett, Indiana
Dr. W. F. Braasch, Minnesota.

Thus, in no uncertain terms have the 100,000 doctors of the country reaffirmed their strenuous opposition to state medicine—that is, to compulsory sickness insurance controlled and managed by the government.

This is no instance of a medical body going off half-cocked on a proposition. The Bureau of Medical Economics of our national association under the chairmanship of Dr. Leland has made an exhaustive study of state medicine in foreign countries and the enthusiasm of the delegates indicated their intelligent understanding of the problems involved.

The stand taken by the House of Delegates was the result of a conscientious and thoughtful consideration of the effect state medicine would have on medical practice in our country. The profession is convinced that government control of medical practice would stifle individual initiative and would lower the standard of medical care to the detriment of the public as well as members of the profession.

While the Wagner Bill introduced in Congress provides for government control of certain activities essentially medical, the so-called Epstein Bill, fostered by the American Association for Social Security for adoption by the various states, is the most dangerous proposal. It is bad, through and through. We suspect that this Association for Social Security is another instance of an organization with a high sounding name, but actually consists for the most part of one individual, Epstein, who has succeeded in persuading some prominent, well meaning philanthropists to lend their names in support.

It is well to bear in mind that the attitude of our national Association is not entirely negative as far as new plans for medical care are concerned. The numerous plans proposed and adopted in various parts of the country have been and are being studied, and the Bureau on Medical Economics is ready to advise county societies contemplating new proposals. It is important, however, that innovations in medical care in general should not violate the essential requirements governing the relation of patient to physician voiced by the House of Delegates at its meeting last June.

ACIDOGEN NITRATE

According to the catalogue of the Abbott Laboratories, Acidogen Nitrate appears to consist of 3 grains of carbamide nitrate (urea nitrate) per capsule. Although the manufacturers propose the use of the preparation for "adjunct therapy in various allergic conditions: hay fever, hyperesthetic rhinitis, migraine, chronic urticaria, serum disease, allergic gastrointestinal affections (diarrhea) and asthma with productive cough," critical textbooks of pharmacology which have been examined do not refer to such use of urea or nitric acid. Acidogen Nitrate Capsules have not been accepted for inclusion in New and Non-official Remedies nor has the Abbott Laboratories requested the Council to consider the product. (*Jour. A. M. A.*, January 12, 1935, p. 139.)

MEDICAL ECONOMICS

**Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association**

B. J. Branton, M. D. **W. F. Braasch, M. D., Chairman** **J. C. Michael, M. D.**

Special Session

It is said—and rightly—that the action taken at the recent emergency meeting of the House of Delegates of the American Medical Association will influence the future of American Medicine for at least a generation.

No meeting of any medical group has ever aroused the same widespread interest. This interest is by no means confined to medical circles, either, but extends to everyone who is concerned with social developments of any kind.

To be sure, widespread publicity has been given by the so-called Philanthropic Foundations to the economics of medicine. Attention of an astounding number of laymen has been focused on the subject as a result of this publicity which has taken the form, of late years, of a concentrated propaganda.

Washington Was Interested

This propaganda, coming at a time of social unrest, has succeeded in thrusting medical reforms into the limelight among the objectives of the present administration in Washington. It is to be supposed, therefore, that Washington was not the least concerned among the lay groups who waited with interest for the stand that Organized Medicine might take in Chicago.

Curiously enough, uncertainty was expressed, even among members themselves, as to what stand might be taken by the House of Delegates. Rumors were circulating to the effect that several radical resolutions were to be presented and that delegations of members were prepared to back new plans for medical practice that were at least tinged with State Medicine. With this background, it was no wonder, probably, that national attention was focused on the historic assembly that met in executive session that Friday morning of February 15.

No Compromise

Any uncertainty that may have existed, as to what that assembly might do, was soon dispelled, however, by the tenor of the preliminary informal discussion.

Several speakers did express the opinion that some definite plan should be devised immediately to solve the problems of medical care that admittedly beset us.

No definite proposals were made, however, and there were other speakers who demanded that there be no compromise whatever with any effort that might be proposed for control of the practice of medicine by any governmental agency.

A reference committee was finally formed by the able speaker, Dr. F. G. Warnshuis. This committee was charged with the formulation of a report that would express the unanimous feeling of the House of Delegates on the matter and serve as a guide to the future policies of American medicine.

Physicians Should Read

The report made by this committee is printed elsewhere in this issue and should be carefully read by every physician. It was unanimously adopted with a few minor changes by the representatives of the medical profession at Chicago. It received wide publicity in the national press and will doubtless receive attention in the periodicals, both medical and lay.

That the report must have a very definite effect upon any action on this subject contemplated by the President's advisors goes without saying. It has placed American medicine firmly back of the stand that an uncontrolled profession is essential to the best interests of the public health. It has demonstrated that its members will not succumb to any temptation for immediate gain which would eventually bring disaster not only upon the public health but upon themselves as well. The entire discussion was in keeping with the best traditions of medicine.

Medicine's Job

If the report offers no panacea for our social ills, it does make definite the position that medicine must take in their solution.

It is a sufficient answer to those who declared that the profession was torn by dissension and who sought to profit thereby.

It endorsed every action on this question taken by the officers or Board of Trustees of the American Medical Association and it is to be hoped that it will silence any expression by state or county medical societies that does not conform to the principles thus laid down. This hope is based on the fact that the report obviously embodies the feeling of an overwhelming majority of American physicians.

It should be noted that the report does not close the door to experimental changes in medical practice to allow for emergencies or unusual conditions. It simply requires that all systems conform to recognized ethics and principles.

These principles are now clear and definite. Medicine has only to follow them!

A resolution endorsing in every particular the action of the House of Delegates of the American Association taken at the special session in Chicago was passed by the Northwest Medical Conference in session at the Lowry Hotel in Saint Paul, February 24.

One hundred medical officers and councilors from fourteen northwest and middle western states attended this conference. Excerpts from important papers and discussion given at this meeting will be printed in the April issue. Watch for them!

Community Is Liable—Attorney General Peterson

To the members of the Medical Profession of Minnesota:

An opinion of exceptional importance to physicians has just been handed down by the Honorable Harry H. Peterson, Attorney General of the State of Minnesota.

This opinion is brief, pointed and pertinent. It confirms the humanitarian view long held by Organized Medicine on the question of the liability of a municipality or county for the reasonable value of medical services rendered to the indigent sick.

While it is true in many counties that the SERA has taken over care of the indigent, this fact in no sense relieves the local political subdivision of its responsibilities under the laws of this state.

It is for that reason that the Attorney General's opinion, printed here verbatim (with the exception of titles), is of vital importance to every physician in the state.

Physicians Should Be Informed

The Minnesota State Medical Association is most anxious to coöperate with every one in the adequate care for medical needs of the indigent. The association also wants every physician to know just what his rights are and to be fully informed as to the duties and obligations of those who are elected to public office—particularly those public officials who are charged with the duty, under the laws of the state, of providing the necessary medical care for the indigent.

The Attorney General's opinion has the support of established precedent in the Supreme Court of Minnesota.

Read it carefully! Then put it away where it will be readily accessible in the event that *YOU* are confronted with a situation similar to the one outlined in this Ottertail County case.

Fraternally yours,
E. A. Meyerding, M.D.
Secretary, Minnesota State
Medical Association.

Index: Paupers—Emergency Case—Doctors—Medical attendance—Liability of municipality for reasonable value of services.

January 30, 1935.

Mr. William P. Berghuis,
County Attorney,
Ottertail County,
Fergus Falls, Minnesota.

Dear Sir:

Your letter to Attorney General Harry H. Peterson, under date of January 14, together with a letter to you under date of January 10 from the village of Pelican Rapids, has been referred to the undersigned for attention.

It appears from the above referred to communication of the village of Pelican Rapids that a certain family was receiving food, shelter and clothing from said village; that a daughter of said family requested a physician to attend her father who "had an attack of the flu, succeeded by acute bronchitis complicated by a developing articular rheumatism with swollen and painful joints"; and that "heart complications in such cases are always imminent and watchful attendance by the physician is considered necessary." It also appears that the doctor who was requested to attend this man advised the mayor of the village of the situation and sought his authorization "to attend the call," that the mayor "allowed one call only, and further stated that he may not run up a bill"; and that the doctor replied "both verbally and by written letter that if the case requires further attendance it is his duty to render such services and that he will hold the village financially responsible as neither he nor the village may relinquish their responsibility in the case by dropping it."

Bill Was $9.00

It further appears from said communication that said patient was attended by said physician "a number of times between February 13 and March 4, 1933, until recovery was assured"; and that "a bill of $9.00 was rendered for services, the payment of which was refused on the ground that the later calls were not authorized." It further appears that Otter Tail County is operating under the township system of poor relief and that the village employs no regular physician "of the poor."

You inquire if the attending physician has a valid claim for compensation for his services rendered to said patient, in the above referred to case, against the village.

The question submitted by the village authorities involves many questions of fact, a great many of which are not before us. In the first place, it must be determined whether or not this person was an indigent person within the meaning of the law relating to the care of the poor. This is a matter for the determination of the properly constituted village authorities. It must also be determined by such authorities whether or not this person had a settlement for poor relief purposes in the village within the meaning of Section 3161, Mason's Statutes of 1927, as amended by Chapter 385, Laws of 1933. Moreover, it does not definitely appear from the inquiry submitted whether the medical attention to said person was in the nature of acute or emergency treatment. For the purposes of this opinion, however, we assume that the person in question was an indigent person within the meaning of our poor relief statutes; that he had a settlement for poor relief purposes in the village of Pelican Rapids; and that the medical attention furnished by said physician was in the nature of emergency treatment requiring prompt attention.

Generally speaking, a municipality, such as a village, may become liable for poor relief furnished to an indigent person only pursuant to action taken by the governing body of such municipality prior to the rendering or furnishing of such relief. However, it should be noted that there is an exception to this rule in cases where medical attention or services are furnished to such indigent persons in emergency cases or cases of an acute nature requiring prompt and immediate attention by a physician. Ordinarily to constitute such an emergency the case should be such that delay or failure incident to the procuring of authority from the governing body of such municipality would endanger the life and health of such indigent person.

Illness Was Acute

As hereinabove indicated, it appears from the communication of the village officials that the patient in question "had an attack of the flu, succeeded by acute bronchitis complicated by a developing articular rheumatism with swollen and painful joints" and that "heart complications in such cases are always imminent and watchful attendance by the physician is considered necessary." It would appear, therefore, that the case in question was an acute case in the nature of an emergency case requiring immediate and prompt attention on the part of the physician. It also appears from the communication that the person in question was at the time receiving relief from the village and we assume from this that the person had no means of employing a physician.

In counties operating under the so-called township system of poor relief the duty to provide for the poor is imposed by statute upon the various municipalities in such county, and the governing body of such a municipality in such county may not evade the obligation of caring for its poor. Our Supreme Court in the case of Robbins vs. Town of Homer, 95 Minn. 201, said:

> "Neither the county commissioners, where the county system prevails, nor the town supervisors, where they are the superintendents of the poor, can turn their backs upon the proper claim of the poor person. The officials may and should exercise their judgment to prevent improper persons from having relief, but for those who require it they are required to perform this function honestly and efficiently. But a case may arise where such officials cannot, in the nature of things, perform the trust. Under such circumstances, it does not seem just or consistent with sound public policy that the duty should not be performed at all, nor can it be said that the unfortunate pauper who has met with an accident requiring instant succor is to be remediless. The county or town must provide for him as soon as may be. To decline this mandate of humanity and duty wilfully by those upon whom it is imposed would subject such officials to prosecution for misconduct in office.
>
> The same reason exists in the case of the poor of a town as of a county for calling a physician where the exigency exists, but in the one instance it has been provided for; in the other, it has not. It is true that the obligations to provide for the poor are statutory. These, as we have indicated, are matters of regulation; **but where there can be no regulation from the very nature of the case, it must be that necessity will supersede the exercise of statutory authority, and immediate aid for the sick person should be furnished.** A deprivation of it might inure not only to injure the poor person, but to the detriment of the public, for delay in the treatment of the injured party might entail added pecuniary burdens.
>
> It is true that ordinarily there must be a request from a person authorized to make the same to constitute a basis for contract liability, but there are some exceptions to this rule, as where a person lies under a moral and legal obligation to do an act, and another does it for him, under such circumstances of urgent necessity that humanity and decency admit of no time for delay. Here the law will imply a promise to pay without proof that it has been made, when there was an expectation of reimbursement."

In the above case our Supreme Court further said:

> "If Lessard, the poor person in this instance, had died, and the supervisors had been absent, we have little doubt that a person providing for his burial would have a legal claim against the town; and, upon the same reasons, why not a physician whose ministrations in a pressing emergency seek to avoid what may result in his death? The supervisors upon whom the duty to secure the physician was imposed under legal as well as moral obligations had not provided for the same, and we have no doubt that it should be held that the physician who immediately answered the call of emergency, perhaps to save life, or diminish the increase of expenditures against the public, would have a valid claim for compensation."

Physician's Claim Valid

Applying the rules of law laid down by our Supreme Court in the above referred to case to the facts submitted in your inquiry, it appears to us that the physician has a valid claim for the reasonable value of his services in the instant case. The case seems to have been an acute one, requiring watchful and prompt attendance on the part of the physician.

It further appears to us that this was such a case that, from the very nature of the complications involved in the same, the mayor, a layman, was not in a position to determine whether the patient in question needed any additional emergency attendance on the part of the physician.

Under the circumstances, therefore, it does not seem just or consistent with sound public policy that the indigent person should not receive any additional medical attendance; nor can it be said that the unfortunate indigent patient who was suffering from such disease requiring immediate and prompt attention should be remediless. As said by our Supreme Court, "to decline this mandate of humanity and duty wilfully by those upon whom it is imposed would subject such officials to prosecution for misconduct in office."

The bill seems to be very reasonable for the services rendered by the physician and we believe that the village is legally liable for the payment of the same.

Yours very truly,
Harry H. Peterson,
Attorney General.
By David J. Erickson,
Assistant Attorney General.

DJE:J

To Improve The Public Health

Whatever the fate may be of the Wagner Bill in toto, there is little doubt in the minds of the well informed that large sums of money will be appropriated by Congress this year to develop and strengthen public health services in the states.

The Wagner Bill proposes to devote $10,000,000 annually to this cause to be administered by the Bureau of Public Health Service.

Of this fund, $8,000,000 is to be allotted annually to the several states to develop state health services, including training of personnel for state and local health work and for the purpose of assisting county or political subdivisions of the States in maintaining adequate public health programs.

Thus, for the first time, funds will be available to promote immunization on a large scale, also vaccination and the early discovery of tuberculosis through the Mantoux tuberculin test and x-ray.

Promotion of these desirable preventive measures has been carried on for years by every means at its disposal by the Minnesota State Medical Association and its ally, the Minnesota Public Health Association. The object was twofold: first, to keep physicians up-to-date on the constantly improving technic involved; second, to educate the public to the necessity of availing itself of these protections.

For Better Technic

The State Association whole-heartedly welcomes this prospect of a new impetus to the extension of all protective public health measures in the State.

At the same time it warns physicians that any failure of interest in these accepted protective measures on their part will surely result in the hiring of full-time men by the public health agencies to do the work which assuredly belongs to local practitioners everywhere.

Demonstration In June

To avoid any such undesirable outcome a special effort is to be made this year to acquaint every member of the association with the latest methods and technic involved in the administration of all the accepted methods of disease prevention.

One of the most important scientific demonstrations to be staged in connection with the 82nd Annual Meeting at the Minneapolis Auditorium will show, by means of actual operation, diphtheria immunization, administration of the Mantoux and all other such procedures.

This will be in the nature of a post-graduate course to be given for two hours each day, Monday, Tuesday and Wednesday, June 24, 25 and 26, by a group of experts. Every physician who attends will have the opportunity of observing closely each operation.

The importance of skill in the latest technic of these procedures on the part of every practitioner—for the sake of medical practice in general as well as for the public good—cannot be overestimated.

"How Can A City Say Thank You"?

Members of the Ancker Hospital staff in Saint Paul recently voted to follow the course pursued for sixty-eight years and continue to contribute their services free to the sick poor.

This vote was taken at the request of the Board of Public Welfare and as a result of agitation in some quarters for remuneration for the staff.

The editorial printed below appeared in the *Saint Paul Pioneer Press* of January 25. It is a fine public tribute to the contribution of medicine and of the individual physiican to public charities—the more welcome because such acknowledgments have not been too frequent in the public press.

It is also a complete answer to the inference in so much of the propaganda for insurance medicine, that the doctors, themselves, are interested only in their fees and not in the extension of their services to all who need them.

Says the editorial:

"In voting to continue to serve without pay, the Ancker hospital medical staff has placed this community under heavy obligation for the 69th consecutive year. That this practice should be so long maintained without interruption is an eloquent testimony to the sincere public spirit of those who perform the service as a duty. Back of it stands the organized medical profession of Ramsey county whose members serve specified periods in keeping the hospital staffed.

"The spirit in which this service is rendered is complete assurance that it is not and has never been in the slightest degree inattentive or perfunctory because it was freely given. This municipality did not create a hospital when it erected a large group of suitable buildings throughout a series of years. It has been made a hospital that ranks high among institutions of the sort because the equipment provided by the city has been employed with professional skill and genuine devotion for the relief of human suffering.

"This has not always been easy for the long and honorable history of Ancker has been variously punctuated with lean years when physicians' incomes have been reduced. Particularly in the last few years the decision to continue free service must have involved self-denials that made the maintenance of the cooperation more conspicuous as a public beneficence. How can a city say thank you?"

Concerning The Foundations

A challenging little pamphlet entitled "Sickness Insurance and the Propagandist Foundations" has just been published by the Wisconsin State Medical Society.

It is the work of the secretary of the Society, Mr. J. G. Crownhart, and it collects in convenient form some illuminating information with which organized medicine, harassed by professional humanitarians, should arm itself well these days.

Remarks Mr. Crownhart:

For Benefits In Kind

"While it has been stated by some that the medical profession should concern itself only with the question of whether the people are or are not receiving 'adequate medical care,' it is significant that the motivating influence and, in considerable part, the funds for the present drive for sickness insurance have come and are coming from extremely limited groups who dominate industry and, obviously, will not have to pay as high a wage if the employees can be given paternalistic benefits 'in kind.' And in this connection it is significant again that Mr. Filene in a recent interview published in part in the *United States Daily* (December, 1934) did not for a minute think it essential to provide a rationing system in order to afford proper distribution to the American people of clothes and like 'necessities of living.' On the contrary, he said, 'I see no reason why we must quit our system of selling and substitute some system of rationing in its place.'

"It seems likewise probable that Mr. Milbank as Chairman of the Board of the Borden Company, would be equally quick to deny that the time had arrived when the government should make distribution of milk a public utility or even go so far as to provide free municipal pasteurization plants that farmers might carry on their own distribution.

"It is also significant that nowhere does it appear in our studies that these Foundations have proposed any legislation to increase the money wage of labor."

They Want Insurance

Following are the very significant data assembled by Mr. Crownhart about the three Foundations most interested in sickness insurance.

"1. *Milbank Memorial Fund.*—Established in 1905 by Elizabeth Milbank Anderson with total gifts of over $9,000,000. Mrs. Anderson was the daughter of Jeremiah Milbank, organizer and builder of the Chicago, Milwaukee and St. Paul railroad. She and her brother Joseph were heirs of the Jeremiah Milbank fortune. The Milbank Memorial Fund has always been under conservative direction closely connected with important banks, corporations and their legal advisors. Albert G. Milbank has been a member of the Board of Directors of the Borden Company and affiliated concerns and is now its president. Associated with him on the Board are Thomas Cochran, a member of the firm of J. P. Morgan Co.; Frank L. Polk, another Director of the Chase National Bank and one of the leading corporation attorneys of New York; and Cornelius Bliss, a director of the New York, New Haven & Hartford, the Radio Corporation of America, the Bankers' Trust Co. and the New York Life Insurance Co.

"Employees of the Fund have included John A. Kingsbury, secretary, who collaborated with Sir Arthur Newsholme in writing "Red Medicine" and who has been an outstanding propagandist for sickness insurance; I. S. Falk, a bacteriologist who was Professor of Bacteriology of the University of Chicago in 1920, Associate Director of Surveys of the Chicago Health Department 1925-27 and an Associate Director of the Committee on Costs of Medical Care; and Edgar Sydenstriker, who is also part time statistician for the United States Public Health Service.

Medical Director, Michael Davis

"2. *The Julius Rosenwald Fund.*—This fund was incorporated in 1917. In 1928-29 the Fund began to provide for 'distribution of medical services, particularly to the man of moderate means.' The assets of the Fund in 1929 amounted to $34,000,000 and the Fund itself provides that both income and principal shall be expended by 1957. Up to his death in 1932 Mr. Rosenwald served as chairman of the Board of Trustees. In 1927 E. R. Embree, a former reporter of the *New York Sun* who previously served as vice president of the Rockefeller Foundation, became president of the Julius Rosenwald Fund. The Fund has given support to the magazine *Survey* and has been largely interested in Negro welfare.

"The Fund employs Michael M. Davis (not a physician) as its Medical Director and C. Rufus Rorem as Davis' assistant.

"Davis was director of the Boston Dispensary from 1910 to 1920; organizer of the pay clinic for people of moderate means in Boston in 1913; organizer of the Cornell pay clinic in New York City in 1921 and has been Director of Medical Services of the Fund since 1928. He was a member of the Executive Committee of the Committee on Costs of Medical Care and a signer of its majority report.

"Rorem, Davis' assistant, was an instructor in Accounting at the University of Chicago from 1924 to 1927 and an Associate Professor in 1929. In the years 1928 and 1929, he was Assistant Dean of the School of Commerce and Administration. He is listed as an Economist and Accountant with the Committee on Costs of Medical Care during the years 1929-31. In recent years he has been 'loaned' by the Fund to the American Hospital Association to promote a program of selling hospital prepayment insurance plans.

Gift Of Edward Filene

"3. *The Twentieth Century Fund, Inc.*—With offices at 11 W. 42nd St., New York City, this Fund was organized by Edward Filene of Boston for the 'increase and stabilization of social well being.' The funds of the organization have been furnished almost exclusively by Mr. Filene, who is president of the William Filene Sons Co., of Boston. The Fund has expended in the neighborhood of $850,000 up to 1933 and now holds $450,000 in trust. Trustees of the Fund include Newton D. Baker, former Secretary of War; John H. Fahey, Boston, ex-president of the United States Chamber of Commerce; James G. McDonald, New York City, Chairman of the Foreign Policy Association; Owen D. Young, Chairman of the Board of the General Electric Co.; Dean Roscoe Pound of Harvard Law School; Henry S. Dennison of the Dennison Manufacturing Co., Massachusetts; Henry Bliven, editor of *The New Republic* and Mr. Filene. Conservative members are in the strong majority.

"Mr. Filene declares that he made the initial gift for the five year study of the Committee on Costs of Medical Care.

"The Fund has also contributed to the magazine *Survey*, but the Fund, itself, appears in general to have relied upon the efforts of individual business men and industrialists rather than upon action by the government through legislation to advance the condition of labor. None of the economic studies sponsored by the Twentieth Century Fund appear to have touched upon hours of labor or low wages. Mr. Filene, himself, has spoken at length on many occasions to advocate some form of sickness insurance."

"Benumbing Effect"

In connection with the above information there is an interesting quotation from an investigation made in 1915 by the United States Commission on Industrial Relations:

"The domination of the men in whose hands the final control of a large part of American industry rests," says this commission's report in conclusion, "is not limited to their employes, but is rapidly being extended to control the education and 'social service' of the Nation.

"This control is being extended largely through the creation of enormous privately managed funds for indefinite purposes, hereinafter designated 'foundations,' by the endowment of colleges and universities, by the creation of funds for the pensioning of teachers, by contributions to charities as well as through controlling and influencing the public press.

"The funds of the foundations represent, largely, the results either of the exploitation of American workers through the payment of low wages or of the exploitation of the American public through the exaction of high prices. The funds therefore, by every right, belong to the American people.

"As regards the foundations created for unlimited general purposes and endowed with enormous resources, their ultimate possibilities are so grave a menace, not only as regards their own activities and influence, but also the benumbing effect which they have on private citizens and public bodies, that if they could be clearly differentiated from other forms of voluntary effort it would be desirable to recommend their abolition. It is not possible, however, at this time to advise any clear cut definition upon which they can be differentiated."

It is upon well taken ground, therefore, that Organized Medicine in America has shown its disapproval of the impractical plans for care of the sick advanced by these Foundations and has questioned some of their motives.

"Minnesota Comes Of Age"

The Minnesota State Planning Board under the chairmanship of Dr. Richard E. Scammon, Dean of Medical Sciences of the University of Minnesota, with the assistance of Roland S. Vaile, Federal Consultant, has made its voluminous report.

In an attractive little publication copiously supplied with plates and graphs, this very complete report tells an absorbingly interesting story of a great state "coming of age."

Every phase of its condition and accomplishments has been measured and evaluated. Naturally, health and the progress made in sanitation, disease prevention and preservation of life have received minute attention.

The report of Board's Committee on Public Health, of which Dr. H. A. Whittaker is Chairman, is of great interest to the medical profession, which has played so large a part in its progress in the past.

Every physician is urged to secure a copy of the report of this Committee and read all of its findings and recommendations carefully. The first three of the latter are printed herewith because they suggest certain departures from traditional methods of handling problems of public health and disease. Also they should serve to emphasize the importance for the general practitioner of assuming some of the responsibilities himself that otherwise will certainly devolve upon enlarged agencies of public health.

Protection Of The Public Health

"1. That in a statewide public health program emphasis be placed upon activities directly related to the protection of the public health; such as, the prevention and control of communicable disease, the diseases attendant upon infancy and maternity, occupational diseases and hazards, deficiency diseases, mental diseases and such other diseases, hazards and menaces as are now or from time to time may be demonstrated to be preventable to a greater or less degree.

"2. That the activities for the control of preventable diseases and the promotion of health including the work in relation to environmental sanitation and the hygiene of maternity and infancy now carried on under the Divisions of Administration, Vital Statistics, Preventable Diseases, Sanitation, and Child Hygiene be continued and extended to cover the public health aspects of Occupational Diseases and Hazards, Mental Diseases, Deficiency Diseases, Cancer, Diabetes Allergy, Diseases of the Heart and Vascular System.

"3. That the county or district organization with a full-time health unit, having as a minimum personnel a trained medical health officer, a certified public health nurse, a registered sanitary engineer, and a clerk, be used for health administration instead of the existing township organization which was established in 1866. That until such organization is effected the State Board of Health be enabled to employ district, whole-time, trained medical health officers to cooperate with local health boards and to have general supervision of all health work in the district. That local health boards as well as school boards extend the public health and school nursing services through employment of certified public health nurses."

Minnesota State Board Of Medical Examiners

License Of Dillinger's Physician Revoked

In the Matter of the Revocation of the License of Dr. Clayton E. May.

At the regular meeting of the Minnesota State Board of Medical Examiners held on February 9, 1935, the license to practice medicine of Dr. Clayton E. May of Minneapolis, was revoked.

Dr. May was convicted on May 23, 1934, in the District Court of the United States, District of Minnesota, Third Division, of the crime "of conspiring to harbor and conceal a fugitive from justice, said fugitive being one John Dillinger." Following his conviction he was sentenced to a term of two years in the Federal Penitentiary at Leavenworth, Kansas.

The Board at its meeting in July, 1934, ordered a citation to issue requiring Dr. May to show cause why his license should not be revoked because of this conviction. The service of the citation was delayed in order to permit Dr. May to take an appeal to the United States Circuit Court of Appeals. This appeal was not taken and the citation was served upon Dr. May at the Federal Penitentiary at Leavenworth, Kansas. At the meeting of the Medical Board on December 8, 1934, a special appearance was made on behalf of Dr. May objecting to the jurisdiction of the Board to proceed with the case on the ground that the service of the citation had not been according to law, the particular objection being that the citation was served outside the State of Minnesota. The question was submitted to the Hon. Harry H. Peterson, Attorney General of the State of Minnesota, who ruled that the service was valid and that the Board has jurisdiction to proceed.

Note.—It must be remembered that Dr. May was indicted and convicted by a jury of the crime of conspiring to harbor and conceal a fugitive from justice. He was not indicted because he treated John Dillinger's bullet wounds. The indictment was based upon the fact that Dillinger was brought to an apartment house on East Fourteenth Street in Minneapolis where Dr. May attended him professionally. John Dillinger was entitled to medical treatment, but the government proved to the satisfaction of the jury that in addition thereto Dr. May conspired to conceal him and provided him with a refuge in order that he might escape apprehension. Dr. May did not deny treating Dillinger, but pleaded duress.

In Memoriam

Florence John Halloran

1859-1935

Dr. Florence John Halloran, pioneer southern Minnesota physician, died January 23, 1935, at the home of his son, Dr. W. H. Halloran, in Jackson.

Born October 3, 1859, in Chatfield, Minnesota, Dr. Halloran received his early education in the public schools of that city. Later he attended the Campion Academy at Prairie du Chien, Wisconsin. He graduated from the Rush Medical College of the University of Illinois.

For one year after his graduation he practiced medicine at Forman, North Dakota, and then returned to Chatfield, where he practiced his profession to the time of his death with the exception of about ten years spent in Saint Paul. During the past few years he had spent some time assisting his son in Jackson.

In 1888, Dr. Halloran married Miss Nellie Tracy, who died in August, 1934. Besides his son, Dr. Halloran is survived by a sister, Mrs. Nora Mannahan, of Chatfield, and a brother, Timothy Halloran, of Saint Paul.

Patrick Henry O'Connor, M.D.

1878-1934

Dr. O'Connor, long-time resident and prominent physician of Amboy, Minnesota, died at home Christmas eve following a week's illness.

Dr. O'Connor, who was born in West Fork, Maryland, July 7, 1878, went to Little Fort, Iowa, when he was four years of age, living there until his sixteenth year, when he began attendance at a seminary. After graduation, he decided upon a medical career, and entered Hahnemann Medical College at Kansas City University, from which he graduated in 1906.

One year after his graduation from that institution, he married Anne Keenan of Carpenter, Iowa, and soon afterward moved to Amboy to establish a practice. He had lived in Amboy continuously since that time.

E. K. Smith

1870-1934

Dr. E. K. Smith, Duluth, was born in Tennessee April 15, 1870.

He attended Knoxville College in Pennsylvania, where he received his A.B. degree in 1891. Dr. Smith was a clergyman for years before he studied medicine. He received his M.D. degree at McGill University in Montreal in 1923 and was granted his medical license in Minnesota in 1924, and practiced in Duluth until his death, October 4, 1934.

Dr. Smith was a member of the St. Louis County Medical Society and the State and American Medical Associations. Dr. Smith was unmarried. He is survived by a sister.

COMMUNICATION

ESSENTIAL THROMBOCYTOPENIC PURPURA

Carl O. Kohlbry, of Duluth, in his paper on "Essential Thrombocytopenic Purpura"* says, "Purpura hemorrhagica was first separated as a distinct entity from other types of bleeding by Werlhof in 1771-1775" (page 15).

Paul Gottlieb Ferlhof (1699-1767), of Helmstädt, and court physician at Hannover, died in 1767. His original description of purpura hemorrhagica or morbus camulosus Werlhofii appeared in a *Dissertation* published at Brunswick in 1735 (at the age of thirty-six). It was re-published in 1775 in Opera Omnia, Hannover, II, 615-636. Vide: Observationum de morbomaculoso Haemorrhagico (et noxiis nonnullis mytulis (Brunswigal, 1735), in opera medica, collected and edited by J. E. Wichmann, Hannover, Helwig Brothers, Part 2, pages 615-632, 1775.

It should be noted that purpura hemorrhagica *(non-pestilential, afebrile)* was observed by J. E. Despars (1390-1465), J. H. Cornarius (1500-1558), Fracastorius (1546), and Ingrassia (1510-1580). Lazarus Riverius (1589-1665) wrote on the subject (1646) and Amatus Lusitanus (Joh. Rodriguez) described the condition (1556). Others who referred to it are Lentilus Rosinus (1657-1733), Culpepper (1646), Cugalemus (1658), Diemerbroeck (1609-1674), Rombergius, Sauvages (1706-1767), Dolaeus, Zwingerus, Gregorius Horstius, Graff (1775), and Adair (1789).

Cusson (1727-1783) spoke of "De Purpura sine febre" and "purpura apyreta." Pezoldus and Zwingerus discussed "maculæ nigræ sine febre" and J. W. Romberg (1699) saw a woman aged thirty-five years: "De Narium, gingivarum et uteri hemorrhagica subitanea cum *petechiarum eruptione absque febre.*"

H. Fracastorius (1478-1553), in De Morbis Contagiosis Liber II, Cap. 6, pages 43 obverse and 44, Venetiis 1546, speaks of "De febre quam lenticulas uel puncticula uocant." Amatus Lusitanus, in his "Curationum Medicinalium" Centuria III, p. 286, 1556, Curatio 70, Basileæ, discusses—"In qua agitur, de exanthematibus, morbo dicto pulicari, absque febre in puero erumpente."

References: Goldstein, H. I.: Medical Review of Reviews (New York), 40: No. 9, 471-492, September, 1934; No. 11, 594-606, November, 1934; No. 12, 647-651, December, 1934. Archives of Dermatology and Syphilology (Chicago), 26:282-308, August, 1932; Journal of Amer. Med. Assoc. 100: page 1453, May 6, 1933; Journal of Medical Society of New Jersey 32: No. 2, February, 1935 ("Hemorrhagic Blood Dyscrasias").

Hyman I. Goldstein, M.D.

1425 Broadway,
Camden, New Jersey.

---

*Minn. Med., 18:15-20, (Jan.) 1935.

MISCELLANEOUS

EXTENSION COURSE IN REFRACTION

A month's course in Elementary Refraction, designed especially to appeal to rural medical practitioners who might wish to supplement their general practice in medicine by work in the field of refraction and physiologic optics, will be given April 1 to 28 at the University Medical School under the supervision of the Department of Ophthalmology. The registration will be limited to eight physicians. In addition to formal instruction in refraction, provision has been made to give participating doctors opportunity to examine patients at the Wilder Foundation in St. Paul and at the University, Ancker, and city out-patient clinics.

The course of instruction has been arranged with the purpose of furnishing sound training in the elements of ophthalmology so that the local physician will be enabled to bring to bear some scientific knowledge in diagnosing eye trouble. It is intended that instruction will cover the elementary physiology of vision, physiologic optics and testing and recording vision. The mechanical problems of neutralization of lenses and different methods of determining refractive errors and muscle imbalance will be taken up. The theory of and practice in skiascopy and post-cycloplegic refraction are comprised in the course. Training will also be given in transposition of lenses, prescription writing and practical fitting of spectacles.

The instruction is outlined as follows:

Daily (8:30 to 10:30 a.m.). Demonstrations and teaching of practical refraction and retinoscopy will be conducted daily by instructors at the University and Wilder refraction clinics. The program will be varied somewhat on Saturdays, at which time practical work will be given in the fitting of frames and mountings under the supervision of opticians.

Daily (4:30 to 5:30 p.m.). Lectures will be given in a systematic way covering such topics as (1) Elementary refraction, (2) Muscle balance and anomalies and fusion training, (3) Theory and practice of campimetry and perimetry, (4) Ophthalmoscopy and recognition of fundus pathology, (5) Practical hints in refraction and prescription writing.

Daily (1:30 to 3:00 p.m.). Out-patient clinics will be held at the University, Wilder, and City Hospital eye clinics; and also such operative clinics as may be arranged in conjunction with prevailing schedules.

Instruction, didactic and practical, will be given by the Departmental Staff and members of the Faculty chosen by the Head of the Department for their ability to teach and demonstrate special phases of the subject.

Preference in registration will be given to applicants from rural districts desirous of perfecting themselves in refractive work in conjunction with general practice. It is not the object of those who are formulating this course to develop specialists in ophthalmology in this short period. It is intended, rather, that this school may provide a training in fundamentals which will enable each participant to continue practical work with patients and ultimately to become proficient in estimation and correction of refractive errors.

The fee for the course of four weeks will be $80, $50 to be deposited with the application, $30 on registration. Applications will not be received after March 10. Reservation fees will not be returned once a place is *held* for any applicant although if a substitute reservation is made, transfer of the application fee may be arranged.

It will be necessary for each participant to furnish his own ophthalmoscope and retinoscope and to provide himself with a textbook of refraction. Registrants will be required to devote four weeks of their time exclusively to this course. Only eight men can be accommodated. Further information may be obtained from Dr. R. R. Price, Director of University Extension, University of Minnesota.

OF GENERAL INTEREST

NOT SUBJECT TO CODE

Physicians who buy and sell eyeglasses and spectacles as agents of the patients for whom they are prescribed and without making any commercial profit on the transaction *do not* come within the terms of the Optical Retail Code.

Nor are they subject to any assessment under the code.

This is the opinion of the Bureau of Legal Medicine and Legislation of the American Medical Association just received as this issue went to press in response to inquiries of hundreds of physicians who have recently been assessed $3.00 by the Optical Retail Code Authority for each employe.

The Bureau has protested to the code authority and, pending the adjustment of the protests, advises all physicians who buy and sell glasses as part of strictly professional work to refrain from answering the questionnaire sent out by the code authority and also to refrain from paying the fee.

Dr. Milton C. Winternitz, dean of the Yale School of Medicine, has resigned and will be succeeded by Dr. Stanhope Bayne-Jones, professor of bacteriology at the school since 1932. Dr. Bayne-Jones is a Yale graduate of the class of 1910, received his medical degree at Johns Hopkins in 1914, served in the World War and was professor of bacteriology at the University of Rochester for eight years before returning to Yale.

* * *

Addition of one floor to the University of Minnesota hospital to handle psychopathic cases is provided for in a bill introduced in the Senate by Senator Burt Kingsley of Minneapolis. The measure would authorize $124,000 for the improvement and $53,000 for new equipment and maintenance for 1936 and $75,000 for the same purpose in 1937.

* * *

The hospital board at Windom, Minnesota, is making plans for the erection of a new hospital in Windom. J. O. Thompson is president of the board and Mrs. George Warren is secretary.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for March

The Minnesota State Medical Association Morning Health Service

The Minnesota State Medical Association broadcasts weekly at 10:30 o'clock every Tuesday morning over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month will be as follows:

March 5—Neurocirculatory Asthenia.
March 12—Electric Shock.
March 19—Agranulocytosis.
March 26—Children's Dentistry.

American College of Surgeons North Central Section

The American College of Surgeons of the North Central Section, composed of Minnesota, Wisconsin, North Dakota, South Dakota and Manitoba, Canada, will hold a two-day conference Friday, March 15, and Saturday, March 16, at the Lowry Hotel, Saint Paul, Minnesota. On Sunday afternoon, March 17, a community health meeting will be held which will be open to the public at the Saint Paul Auditorium.

The Public Health meeting constitutes an important part of the College's program to assist in the movement for better health and better hospitals. It consists of a series of twelve to fifteen minute talks on health, scientific medicine and hospitals, illustrated in the most part by lantern slides and motion pictures.

During the two-day conference the schedule of meetings are as follows:

Friday, March 15

9:00 A.M.—12 M.	Clinics
9:00 A.M.—12 M.	Hospital Conference
12:30 — 2:00 P.M.	Medical Motion Pictures
2:30 — 5:00 P.M.	Hospital Conference
7:00 — 8:00 P.M.	Medical Motion Pictures
8:00 —10:30 P.M.	Scientific meeting — General Surgery
8:00 —10:30 P.M.	Scientific meeting—Eye, Ear, Nose and Throat Surgery

Saturday, March 16

9:00 A.M.—12 M.	Clinics
9:00 A.M.—12 M.	Hospital Conference
12:30 — 2:00 P.M.	Medical Motion Pictures
2:30 — 5:30 P.M.	Scientific Meeting — General Surgery
2:30 — 5:30 P.M.	Scientific Meeting—Eye, Ear, Nose and Throat Surgery
2:30 — 5:00 P.M.	Hospital Conference

The clinics will be arranged at local hospitals and instructive cases will be worked up and interestingly presented. The hospital sessions will run simultaneously with the Clinic and Scientific meetings and during the first day will consist of medical nursing and economic problems relating to hospital administration. In the afternoon the conference will deal particularly with medical problems of special interest to members of the medical profession. The hospital sessions will consist of round table conferences and demonstrations at the local hospitals. The meetings will be of special interest to hospital trustees, administrators, members of the medical staff, nurses and others.

All of the scientific programs and clinics are open to all regular members of the medical profession whether or not they are members of the American College of Surgeons.

The committee on Local Arrangements of Saint Paul consist of the following: Dr. Wallace Cole, Chairman; Dr. E. M. Jones, Secretary; Dr. Fred Schuldt, Dr. O. W. Holcomb, Dr. W. C. Carroll, Dr. George Earl, and Dr. M. W. Alberts.

American Neisserian Medical Society

The American Neisserian Medical Society, founded on June 12, 1934, is dedicated to the promotion of knowledge in all that relates to the gonococcus and gonococcal infections, that there may be attained improvement in the management of gonorrhea and a reduction in its prevalence. There are 115 charter members and the officers are: Dr. Edward L. Keyes, New York, Honorary President; Dr. J. Dellinger Barney, Boston, President; Dr. P. S. Pelouze, Philadelphia, Vice President; Dr. A. L. Clark, Oklahoma City; Dr. Walter Clarke, New York; Dr. R. D. Herrold, Chicago; Dr. N. A. Nelson, Boston; Dr. Oscar F. Cov, Jr., Boston, Secretary-Treasurer.

The active officers form the Executive Committee.

The society plans to carry out the following program:

The scrutiny of the management of gonorrhea in both male and female.

Clinical and laboratory research in the diagnosis, medical and social pathology, and the treatment of gonorrhea.

Dissemination among the medical profession and the public of authoritative information concerning gonorrhea.

Membership is limited to:

Residents of the United States or its territories, Canada or Mexico.

Graduates of a medical school recognized by the American Medical Association.

Those who are engaged in some phase of the management of gonorrhea.

Invitation to membership is extended to all qualified physicians who desire to work for improvement in the management of gonorrhea. Application blanks can be obtained from the secretary, Oscar F. Cox, Jr., M.D., 475 Commonwealth Ave., Boston, Mass.

International Association For Dental Research

The thirteenth annual meeting of the International Association for Dental Research—now consisting of twenty-six sections in eight nations—will be held on March 16 and 17, 1935, at the Hotel Stevens in Chicago, in coördination there with the annual meeting of the American Association of Dental Schools on March 18, 19, and 20. Papers on research in dentistry and allied fields will be presented chiefly by workers in laboratories and clinics of dental and medical schools in North America and Europe. Each session will be open to all who may be interested. Copies of the official program may be obtained, after March 6, at the office of the Secretary, International Association for Dental Research, 632 West 168th St., New York City.

State Meeting

Dr. William P. Murphy of Harvard Medical School and one of the three 1934 Nobel Prize winners in medicine is one of several distinguished medical speakers who have accepted invitations to appear on the program of the eighty-second annual meeting of the Minnesota State Medical Association to be held at the Minneapolis Auditorium June 24, 25 and 26. Plans for the three-day assembly took permanent form at a meeting of the Committee on Scientific Assembly of the association held in Saint Paul, February 2.

Dr. Murphy's acceptance is announced by the Hennepin County Medical Society, which will sponsor his appearance here. Dr. Murphy, with Dr. George Minot, also of Harvard, and Dr. George H. Whipple of the University of Rochester, received the Nobel award for their work on liver therapy in anemia.

Dr. Richard Pearson Strong, professor of tropical medicine at Harvard, will be brought to Minneapolis for the meeting under the auspices of the American Association for the Advancement of Science, which will be meeting during the same week at the University of Minnesota. Members of the two associations will hold two joint sessions, one Tuesday morning at the Auditorium, the other Tuesday night at the University.

Dr. Harry Alexander of St. Louis has also definitely accepted an invitation to appear on the Monday afternoon program. Dr. Frank Lahey of Boston, whose appearance will be sponsored by the Minneapolis Surgical Society, will speak the same afternoon. His subject will be "Hyperthyroidism and Hyperparathyroidism." Also on Monday's program will be Dr. Edmund Andrews of Chicago, who will talk on "Pathogenesis of Gallbladder Disease." Dr. Thomas G. Orr of Kansas City, Missouri, will speak Wednesday morning on "Venoclysis."

Two clinics to be conducted Monday and Wednesday mornings will be a feature of the program. One of these will be conducted by University and Twin City physicians; the other by Rochester doctors. Other sessions of the regular program will be devoted to papers by out-of-state speakers followed by discussion.

Scientific demonstrations and exhibits will again be an outstanding part of the annual meeting. These have long been a distinctive feature of the meetings and have grown in importance and interest each year. Due to the increased space made possible by the facilities of the large Minneapolis Auditorium, this year's exhibits will be greatly extended. Moving pictures, lectures and exhibits of various processes will be included.

Howard A. Carter, secretary of the Council on Physical Therapy of the American Medical Association, will bring elaborate equipment for demonstrations. From the Mayo Clinic at Rochester there will probably be sent an exhibit on fever therapy. Phases of physical therapy will be exhibited by Dr. M. E. Knapp of Minneapolis. Arrangements are also being made to have the exhibit of white rats, treated with the thymus extract of Dr. Adolph Hanson of Faribault, which attracted so much attention when shown at a recent meeting in Philadelphia.

Monday night will be devoted to the annual dinner and entertainment being planned by the Hennepin County Medical Society.

Great interest is also being shown in the meeting by technical exhibitors, and unusual amount of space for this time of year has already been reserved by firms catering to the physician.

Kandiyohi-Swift-Meeker

Problems of importance today to the medical profession were taken up at the regular monthly meeting of the Kandiyohi-Swift-Meeker County Medical Society which met at the Lakeland Hotel, Willmar, Thursday, February 14.

These problems included sickness insurance and other threatened social legislation in regard to the practice of medicine, emergency medical relief and the care of the indigent, and malpractice. Unfinished business remaining from the annual meeting was completed and the retiring president, Dr. K. A. Danielson, gave his address. Committee reports were read.

Under the new constitution, the following three new committees were named: Legislation, Drs. B. J. Branton, Karl Danielson, Herman Jensen, H. E. Willmot, W. C. Kaufman and Hans Johnson; Program, Henry Hutchinson, A. F. Branton and R. J. Hodapp; Public Health Education, C. L. Scofield, W. A. Dowswell, F. W. Behmler, E. H. Frost, G. Frederickson, J. C. Jacobs, Lenox Danielson, F. W. Brigham and G. C. Edwards.

The Society auxiliary held its annual meeting at the same time.

Nicollet-LeSueur

Officers were elected at the annual meeting of the Nicollet-LeSueur County Medical Society held at the Lodge of the Engesser Brewing Company, St. Peter, February 1.

Dr. Raymond J. Gully, St. Peter, was elected president; Dr. James J. Kolars, Le Center, vice president; Dr. Swan Ericson, LeSueur, secretary; Dr. Fred P.

Strathern, St. Peter, treasurer; Dr. Joseph O. McKeon, Montgomery, delegate; Dr. Magnus C. Petersen, St. Peter, alternate, and Dr. H. B. Aitkens, Le Center, censor. Censors now include Dr. Gully, Dr. M. E. Lenander and Dr. Aitkens.

The following committee assignments were made by the president: Drs. Strathern, McKeon and Aitkens, Publicity; Drs. Ericson and Lenander, Program; Drs. F. J. Traxler and O. H. Wolner, Auditing; Drs. G. H. Freeman and W. W. Covell, Legislation, and Dr. Petersen, Medico-Military.

Stearns-Benton

Members of the Stearns-Benton County Medical Society held their February meeting at the Breen Hotel in St. Cloud, Thursday, February 21. Following a 6:30 dinner, the program was presented, including a paper by Dr. P. E. Stangl, "Case Reports on Fractures" by Dr. J. B. Buening, and a paper on "An Aid to Diagnosis of Carcinoma" by Dr. J. P. McDowell. Dr. McDowell was chairman for the meeting.

Union Hospital Meeting

At the regular monthly meeting of the Union Hospital Medical Staff, New Ulm, Minnesota, held February 14, 1935, Dr. M. Manson of the Surgical Department, University Hospital, Minneapolis, gave an illustrated address on "Gas Gangrene." Dr. Leonard Lang of the Obstetrical and Gynecological Department, University Hospital, spoke on "Ectopic Pregnancy." These lectures were well received and were highly instructive.

Members of the Redwood-Brown County Medical Society have a standing invitation to attend these meetings and their attendance is well represented.

Upper Mississippi

At the meeting of the Upper Mississippi Medical Society held January 26, 1935, at Brainerd, Minn., the following officers were elected for 1935:

President, Dr. E. J. Simons, Swanville, Minn.; first vice president, Dr. V. E. Quanstrom, Brainerd; second vice president, Dr. B. W. Kelly, Aitkin; third vice president, Dr. H. L. Lamb, Little Falls; secretary-treasurer, Dr. G. I. Badeaux, Brainerd.

Delegates to State Convention are: Dr. A. T. Agnew, International Falls; (Alternate) Dr. R. F. McHugh, Aitkin; Dr. G. I. Badeaux, Brainerd; (Alternate) Dr. L. F. Hawkinson, Brainerd.

Dr. W. W. Will, Bertha, Minn., was elected censor for three years, 1935-1938. The two other censors holding over are Dr. J. A. Thabes, Sr., Brainerd, 1933-1936, and Dr. B. A. Smith, Crosby, 1934-1937.

The following program was given:

1. Parathyroid Tumors—M. A. Shillington, M.D., St. Paul.
2. Treatment of Syphilis—D. D. Turnacliff, M.D., Minneapolis.
3. Advances in Varucure Therapy—H. O. McPheeters, M.D., Minneapolis.
4. Allergy—R. W. Ellis, M.D., University of Minnesota.
5. Rectal Diseases in General Practice—H. W. Christiansen, M.D., Minneapolis.
6. Health Insurance—Herman Johnson, M.D., Dawson.
7. Motion Pictures of Human Ovulation—Mead Johnson Co.

The Spring meeting of the Upper Mississippi Medical Society is to be held at Aitkin in April and is to be a joint meeting with the St. Louis County Medical Society.

The Summer meeting will be held at Walker in July and will be an outing—picnic and fishing.

G. I. Badeaux, *Secretary.*

WOMAN'S AUXILIARY

President—Mrs. Martin Nordland, Minneapolis
Editor—Mrs. C. F. Ewing, Wheaton

Mower County

The Mower County Auxiliary met in the St. Olaf Hospital, Austin, Minnesota, Monday, January 28, the president, Mrs. G. E. Hertel, presiding. Following a short business meeting the afternoon was spent in folding surgical dressings. Light refreshments were served by the nurses of the hospital.

* * *

Renville County

The Renville County Auxiliary met at the home of Mrs. George Mesker, Olivia, January 8 and at the home of Mrs. A. A. Passer, Olivia, February 5. Mrs. E. H. Loenholdt of Hector acted as assisting hostess. At the February meeting members enjoyed an instructive talk by Dr. W. A. Coventry of Duluth, president of the Minnesota State Medical Association. The doctors joined the ladies at lunch.

* * *

Wright County

A meeting of the Wright County Auxiliary was held early in February at the home of Dr. and Mrs. J. J. Catlin. Dr. and Mrs. E. F. Robb and Dr. and Mrs. J. M. Hayes of Minneapolis were guests. The afternoon was devoted to a discussion of children's diseases and operations. A buffet supper was served following the meeting.

PROCEEDINGS *of the* MINNESOTA ACADEMY OF MEDICINE

Meeting of December 12, 1934

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, December 12, 1934, with the president, Dr. Archa Wilcox, in the chair. The meeting was called to order at 8 p. m.

There were fifty-one members and one guest present.

Minutes of the November meeting were read and approved.

Upon ballot the following officers were elected for the year 1935:

President—Dr. Alexander Hall, St. Paul.

Vice-President—Dr. John Butler, Minneapolis.

Secretary-Treasurer—Dr. R. T. LaVake, Minneapolis (reëlected).

The scientific program followed.

FUNDUS EXAMINATION IN SHORT WAVE-LENGTH LIGHT

Arthur Edward Smith, M.D.

Minneapolis

Abstract

Gradual evolution of the ophthalmoscope from the first crude instrument of von Helmholz. Various types of illumination used as the light source in ophthalmoscopy: sunlight, candlelight, oil and gas lamps, incandescent electric bulbs—first the ordinary lamps and later the miniature bulbs for self-contained illumination. Most of the advance for a considerable time was in the direction of greater convenience rather than of increased efficiency. Various kinds of ophthalmoscopes mentioned, many of them ingeniously contrived but having one vital disadvantage in common, *i.e.*, the employment of a light-source in which the retina is practically transparent and in which it is, therefore, except for its blood vessels, practically invisible. This is due to the presence in this light of the red and orange rays of the spectrum which are of long wave length and have great penetrating power. On the other hand, the green and blue rays, being of short wave length, have much less power of penetration and hence are easily reflected. When these rays reach the retina they do not pass through it, as some are reflected, some absorbed, and a few are altered by the retinal stroma. The retina, therefore, is rendered visible and the chorioid relatively invisible in persons with normal pigment development.

Mayou was probably the first man to view the fundus in short wave length light, using the mercury vapor lamp as a light source. The clinical importance of fundus examination in red-free light was first emphasized by Prof. Alfred Vogt in 1913. Gradual improvement in technic and interpretation followed. Normal fundus viewed in red-free light has a light yellowish-green color, the blood vessels showing very dark, almost black, against this background. The disc appears white, resembling the disc of simple atrophy in ordinary light. The macula lutea, invisible in ordinary light, shows as a lemon-yellow area. Advantages of short-wave-length light are particularly apparent in study of this area. Changes are obvious at a much earlier time than they would be discoverable with ordinary light. Congenital absence or mal-development of the macula, responsible for defective development of sight in some young children, is immediately recognized in short-wave-length light when it can only be inferred otherwise. The greatest value of this method of examination lies in the clearness with which the retinal structure is brought out. The course of the nerve fibers running out from the papilla can be traced distinctly throughout the fundus. They appear as whitish lines. Thus, early optic atrophy can be recognized since in this condition the fibers disappear and the area involved shows a sort of marbled appearance long before any ophthalmoscopic changes are discernible by ordinary light.

The unique diagnostic value of the method is apparent. In optic nerve disease it is possible to differentiate a primary from a secondary atrophy since in the latter the smallest amount of exudate on the disc or its border can be detected when it would probably be entirely invisible in ordinary light. In inflammatory disease the fibers first swell and appear abnormally prominent and then, as atrophic changes set in, gradually disappear. In retrobulbar neuritis the disappearance of the papillo-macular bundle, leaving the remaining fibers intact, is characteristic. In disseminated sclerosis, patches of the fibers will be found wanting. The significance of the various fundus reflexes, particularly the double contour reflexes, are described by Vogt. These are formed by the rosette-shaped folds of the membrana limitans interna radiating from the region of the fovea centralis. These are particularly interesting when observed in contusion injuries of the eyeball, in retinal detachment, etc.

The next major improvement in ophthalmoscopes will probably be the development of an instrument which will combine the magnification and the binocular eye-piece of the Gullstrand ophthalmoscope with adequate short-wave-length illumination.

More efficient fundus examination is almost as important in general diagnostic work as it is in ophthalmology. For example, the experience of life insurance companies has demonstrated that it would be extremely desirable if hypertension could be detected at a much earlier time than is at present possible and it does not seem that anything could offer greater promise of help in this direction than the perfection of the technic of studying the blood vessels of the fundus. Gradual improvement in convenience and ef-

ficiency of apparatus for short-wave-length fundus study. Slit-lamp light with red-free filter is satisfactory. The new Lauber red-free lamp is comparatively inexpensive and sufficient for all practical purposes. The various small hand ophthalmoscopes with red-free filters, because of the inefficiency of the light source, are practically worthless.

Dr. Smith gave a lantern-slide demonstration of paintings of fundus oculi in ordinary and in red-free light illustrating the value of the method.

Discussion

Dr. F. E. Burch (St. Paul): I am very glad that Dr. Smith has emphasized the value of red-free light but I would, perhaps, correct a statement he made that the filters furnished for the ordinary ophthalmoscopes are not valuable. Dr. Smith has emphasized the value of red-free light particularly for examination of the caliber of the vessels; and in the ophthalmoscopes furnished by Bausch & Lomb the red-free filter is very valuable for studying such vascular changes. On the other hand, they are of no value whatever in showing the fine nerve fiber changes such as Dr. Smith has shown. The principal value to me of the red-free light has been in the study of vascular changes and not in the study of nerve fiber changes. In the use of the ophthalmoscope, one must have good dark adaptation, just as is true in using the fluoroscope. If one does not take the necesary time it is principally a matter than real diagnostic means of ophthalmoscopic study of contrast in emphasizing the vascular changes rather of vascular changes.

Dr. A. E. Smith (in closing): Dr. Burch's exception to my statement that the small self-illuminated ophthalmoscopes are worthless is well taken. What I meant was that they are inadequate from the standpoint of the oculist since I have never know any one who could, with them, make out the nerve fibers and many other important details. I am entirely in accord with what Dr. Burch says—that they are of aid, particularly to the general diagnostician, in the study of the vascularization of the fundus.

OPERATIVE DIVISION OF THE HORSESHOE KIDNEY

Report of Five Cases With Exhibition of Pre-Operative and Post-Operative Pyelo-Ureterograms

Motion Picture Demonstration of Renal Symphysiectomy for Horseshoe Kidney

Frederic E. B. Foley, M.D.

Saint Paul

On two previous occasions, the December, 1931, and March, 1934, meetings, I have discussed before this Academy the subject of Horseshoe Kidney: its embryology, anatomy, the mechanism of obstruction usually acompanying it, the clinical manifestations of the condition and its diagnosis, with particular reference to urography. Surgical correction of the condition by division or resection of the isthmus was discussed and three cases in which these procedures were employed with excellent end-results were reported. The first of these three cases was encountered on the Urologic Service at the Ancker Hospital, Saint Paul, was beautifully managed by my associate on the service, Dr. Philip F. Donohue, and was originally reported by him at the American Urological Association meeting in 1931.

Since our March, 1934, meeting, at which these three cases were presented, I have made division and resection of the isthmus of the horseshoe kidney in two additional cases, making a total of five cases as basis for the present presentation. A motion picture film of the operation in one of these latter cases was made and will be shown in connection with this discussion to illustrate the method and technical details of the procedure.

Prior to these cases there had been reported in the literature only eleven cases of division of the isthmus of the horseshoe kidney, all of them in Europe. Accordingly the five cases to be presented here are the only American cases on record, represent 32 per cent of the total number reported, and, though small in number, make by far the largest single series of such cases to have been reported or to have come under the personal observation and management of one individual.

From the eleven scattered European cases reported by several different individuals, no well supported conception of indications for the operation and the results to be achieved by it had emerged. The five cases to be considered here are so nearly identical as to symptoms complained of, anomalous and pathologic conditions demonstrated by urography, and excellence of results obtained by operation that it is felt a well defined and well supported conception may be drawn from them and that indications for the operation may be enumerated.

Past and present literature abounds in reports of operations on the horseshoe kidney for stone, tumor, tuberculosis and various other lesions. In such cases the anomaly has been considered incidental, either a conservative operation for correction of the lesion associated with the anomaly has been performed, or the affected half of the horseshoe kidney has been removed. The present report is not concerned with this aspect of the problem presented by horseshoe kidney for in none of these cases except one was there any significant abnormality other than the anomaly and the pelvic dilatation accompanying it. In the one case of exception to this a stone in the left pelvis was removed at the time of operation for division of the isthmus. However, the stone was known to have formed recently for a satisfactory urinary tract radiograph made three years prior to operation showed no calculus, while bilateral pain of the sort that often accompanies the anomaly had been present for many years prior to this. Accordingly these are cases of horseshoe kidney *per se,* with symptoms directly and solely attributable to the anomaly. Associated lesions such as stone, tumor or tuberculosis were not present to cause symptoms or to provide indications for operation and were not the object of surgical attack. We were dealing only with pain incident to horseshoe kidney. In determining indications for operation only this pain and varying degrees of pelvic dilatation, possibly suggesting progressive renal impairment, came up for consideration. The results obtained by operation are attributable to correction of the anomaly.

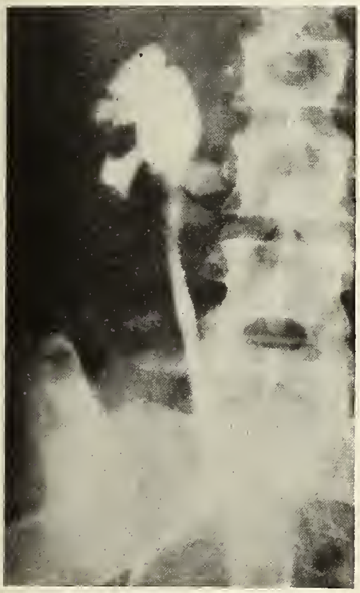


Fig. 1.

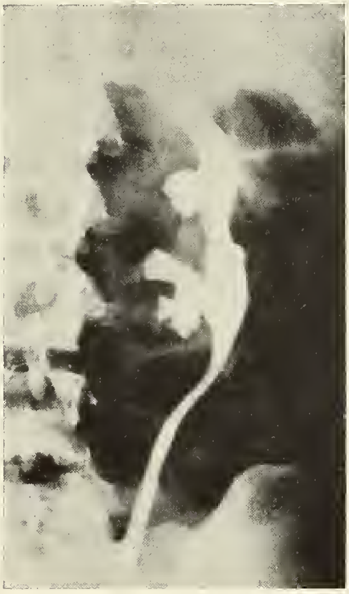


Fig. 2.

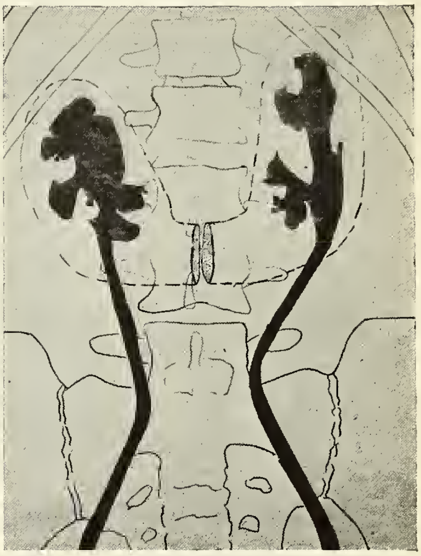


Fig. 3.

Fig. 1. (Case 1. Right flank and abdominal pain.) Right pyelogram before operations. Note the typical features of horseshoe kidney: low position, long axis oblique toward midline below, under-rotation of lower pole with inferior calyces extending medially. Grade 1 hydronephrosis. (From *Journal of Urology.*)

Fig. 2. (Case 1.) Left pyelogram following first operation (Donohue): division of isthmus and right nephropexy. (Flank and abdominal pain exactly similar to the right sided painful symptoms which were relieved by the operation were now present on left side): Note the typical features of horseshoe kidney; low position, long axis oblique toward midline below and under-rotation of lower pole with inferior calyces extending medially, still present after division of isthmus and right nephropexy. (From *Journal of Urology.*)

Fig. 3. (Case 1.) Tracing to show composite right and left pyelograms with division of isthmus indicated. (From *Journal of Urology.*)

It is well known that with our modern methods of urologic diagnosis a considerable number of horseshoe kidneys are discovered each year in which the anomaly is not associated with any other lesion except possibly the slight pelvic dilatation that often accompanies the condition. In a large proportion of such cases of uncomplicated horseshoe kidney the cystoscopic and urographic examinations have been made because of pain. It is quite certain that in a substantial number of these cases the horseshe kidney is responsible for the pain and yet there are reported in the literature only eleven cases in which division of the isthmus without nephrectomy was undertaken either for relief of this pain or any other purpose.

It is not to be said that mere presence of a horseshoe kidney is adequate indication for surgical division of the isthmus. From my own experience I am able to cite three cases in which the existence of horseshoe kidney was positively demonstrated but without indications for this operation. In two of these there was neither pain nor pelvic dilatation. In the third there was moderate bilateral pelvic dilatation but no long history of the recurring or persistent pain characteristic of horseshoe kidney. In this case there was left sided sudden severe pain of recent duration and this was accompanied by a calculus in the left pelvis. The stone appeared to be entirely responsible for the sudden unilateral colic. At operation the stone was removed but the anomaly was not corrected for in the absence of pain of long standing there appeared to be no indication for it. Complete and permanent relief of pain followed removal of the stone. There has been no progressive impairment of renal function and check-up bilateral pyelo-ureterograms seven years after removal of the stone showed no increase of pelvic dilatation. In the absence of pain and in the absence of progressive dilatation and renal function impairment it was not felt that this case provided indications for division of the isthmus.

When it is definitely demonstrated that the anomaly is responsible for pain of which the patient seeks relief, this may be considered adequate indication. In all of the present cases this indication was found and in addition various degrees of pelvic dilatation or hydronephrosis were present. Obstruction as evidenced by pelvic dilatation and progressive impairment of renal function, even though not accompanied by pain, would provide a good indication for interference to the end of avoiding renal insufficiency. Up to the present I am unable to share Gutierrez' view that mere existence of the anomaly is sufficient indication for the operation.

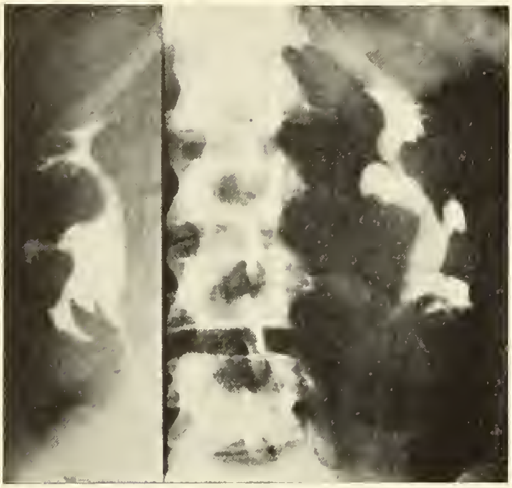


Fig. 4. (Case 1.) Composite right and left pyelogram following first operation for division of isthmus and right nephropexy and second operation (Donohue) for left nephropexy. Note the now normal features of both pyelograms: normal position, long axis oblique toward midline above, normal rotation of lower poles with inferior calyces extending laterally and absence of pelvic dilatation. (From *Journal of Urology*.)

The Anomalous Development and Anatomy

Horseshoe kidney represents a departure from normal development which in its adult form and relations constitutes three anomalies: (1) of form, (2) of position, (3) of vascularization.

In the development of horseshoe kidney, fusion of the lower poles occurs early in fetal life. The caudal ends of the two renal blastemata from which the permanent kidneys are formed lie close to the midline below the pelvic brim and it appears that there is opportunity for fusion at this time. Boyden believes that fusion occurs during migration of the kidneys, particularly at the time they pass through the brim of the bony pelvis and between the iliac vessels, at which time they closely approach each other. In any case the fusion does occur and represents the anomaly of form.

Migration of the normal kidney has three components of movement: (1) ascent, (2) rotation, (3) axial deflection.

It appears that full ascent of the horseshoe kidney to the normal definitive position in the renal fossæ is limited by the inferior mesenteric artery lying above the isthmus and arresting ascent when the isthmus comes in contact with it. In consequence the horseshoe kidney usually occupies a lower than normal position.

The hilum of the normal kidney early in fetal life is directed ventrally, the calyces dorsally and the ureter, crossing in front of the lower pole, joins the pelvis on its ventral surface. During migration rotation of the kidney on its long axis occurs so that the hilum becomes directed medially, the ureter joins it on what is now its medial border and the calyces extend from it in lateral direction. In the horseshoe kidney, fusion of the two lower poles prevents rotation, particularly at the lower poles, and in consequence the inferior calyces are not directed laterally as they should be but continue to extend dorsally or even medially while the ureter, crossing the isthmus and lower pole, remains ventral to the pelvis and joins its ventral surface.

The long axis of the normal kidney undergoes a deflection or reversal of angle during migration. Early in development the lower pole occupies a position closer to the midline than the upper pole and the long axis is oblique toward the midline *below*. When the normal definitive position in the renal fossa has been reached, these relations have been reversed. The upper pole now lies closer to the midline than the lower pole and in consequence the long axis is now oblique toward the midline *above*. In horseshoe kidney fusion of the lower poles prevents the occurrence of normal axial deflection and the lower poles remain closer to the midline than the upper poles. In consequence the long axis of each half of the horseshoe kidney retains its early fetal direction and remains *oblique toward the midline below*.

The blood supply of the normal kidney constantly changes during its migration and is largely determined by the position of the organ in relation to neighboring vascular trunks. As the kidney ascends, new vessels grow into it above while the lower vessels atrophy and disappear. Because of this it has been said "the kidney ascends a vascular ladder." Normally a single artery and vein arising from aorta and cava are in position to vascularize the whole organ. Because of the abnormal form and position of the horseshoe kidney these normally placed vessels are not capable of completely vascularizing it and in consequence other vessels arising from neighboring trunks persist.

Clinical History

As already indicated, pain is the chief and most frequent symptom of horseshoe kidney. The condition does not always produce pain. The sole cause of pain may be a lesion such as stone, tumor or renal tuberculosis. Occurring in the anomalous kidney, pain of such cause is of no significance peculiar to the anomaly. When present and attributable to the anomaly *per se,* the pain may be of character and location suggestive of origin in kidney or ureter and may be present on one or both sides. On the other hand there may be only vague abdominal pain felt, chiefly above the umbilicus, usually more pronounced on one side.

Varying degrees of upper urinary tract infection manifested by pyuria, chills, fever, etc., may be present.

Gutierrez in his recent monograph mentions vague and indefinite symptoms such as constipation, nervousness and indigestion. In my experience they are not regularly present and do not appear to be directly related to presence of the anomaly.

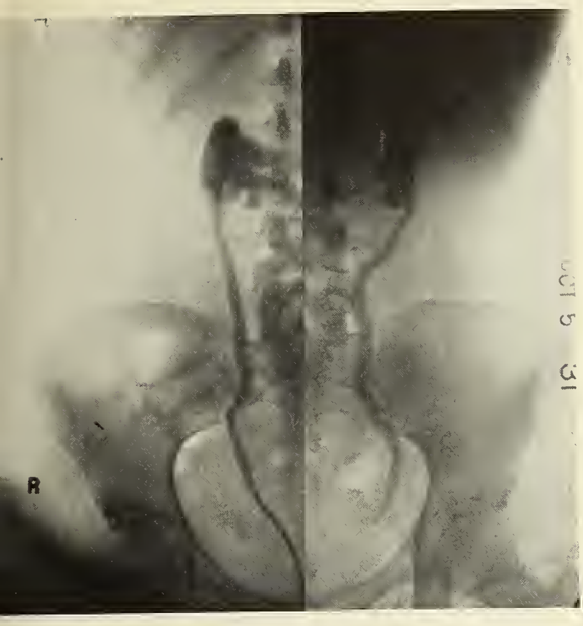


Fig. 5. (Case 2. Right flank and abdominal pain.) Com-osite right and left pyelograms before operations. Note the ypical features of horseshoe kidney: low position, long axis blique toward midline below, under-rotation of lower poles vith inferior calyces extending medially. Grade 1 hydrone-hrosis.

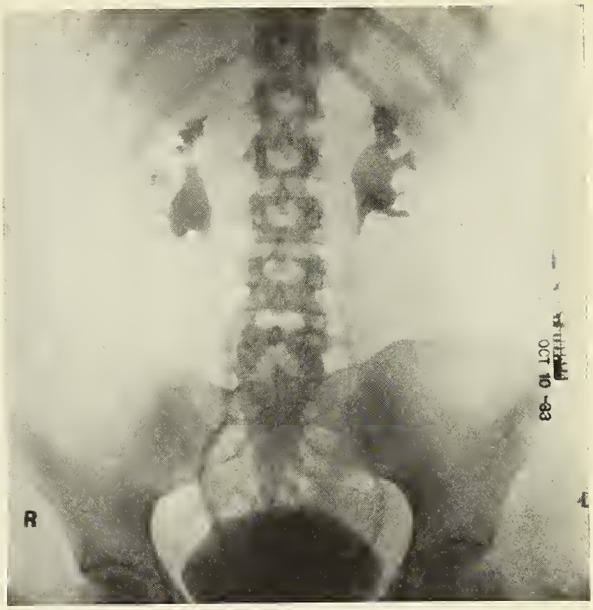


Fig. 6. (Case 2.) Bilateral pyelograms after first operation: division of isthmus and right nephropexy and second operation: left nephropexy for relief of left flank and abdominal pain developed following first operation. Compare with Figure 5 and note that the typical features of horseshoe kidney are no longer present. Position, axis, rotation and direction of calyces all are normal, and the pelvic dilatation present before operations as shown in Figure 5 has largely disappeared.

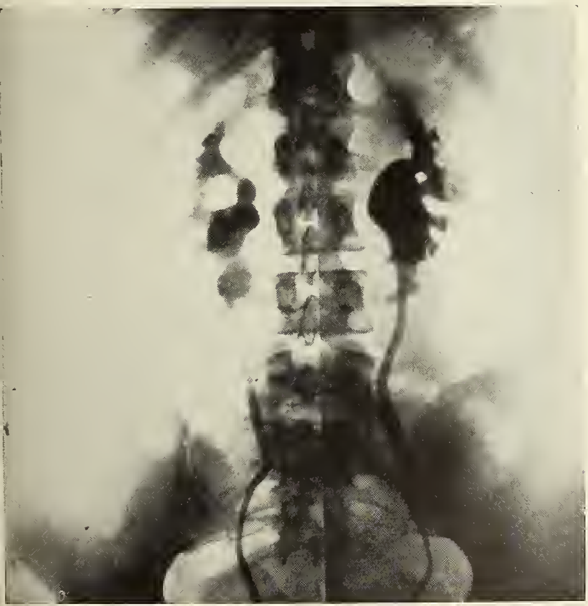


Fig. 7. (Case 3. Right flank and abdominal pain persistent and severe. Left flank and abdominal pain periodic and mild, but worse following division of isthmus and right nephropexy.) Composite right and left pyelograms before operation. Note the typical features of horseshoe kidney: slightly lower than normal position, long axis oblique toward midline below, under-rotation of lower poles with inferior calyces extending medially. Grade 1 hydronephrosis.

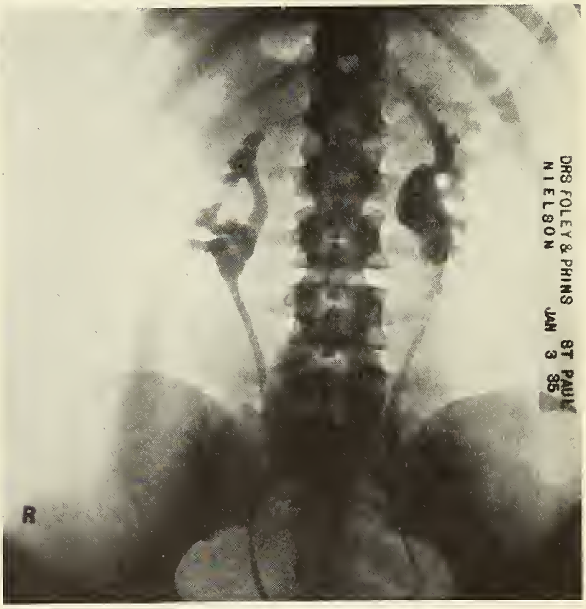


Fig. 8. (Case 3.) Bilateral pyelograms after operation: division and resection of isthmus including inferior calyx and right nephropexy. Compare with Figure 7 and note that the right pyelogram no longer presents the typical features of horseshoe kidney. Long axis oblique toward the midline above, normal rotation of lower pole with all calyces extending laterally. Slight decrease of right pelvic dilatation. The left pyelogram still shows the typical features of horseshoe kidney.

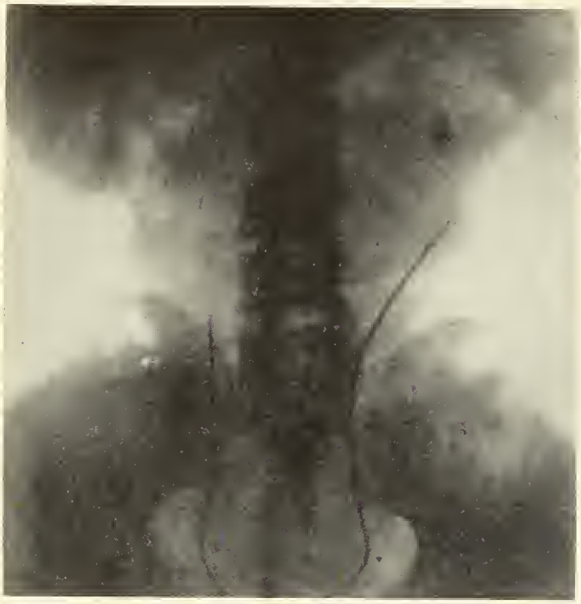


Fig. 9. (Case 4. Long history of left flank and abdominal pain persistent and severe. Right flank and abdominal pain periodic and mild. Recently formed calculus left pelvis, satisfactory plain urinary tract x-ray film was negative for calculus three years prior.) Plain urinary tract x-ray film. Calculus shadow left renal area. Suggestion of shadow of isthmus probably is an artifact occasioned by gas in the bowel.

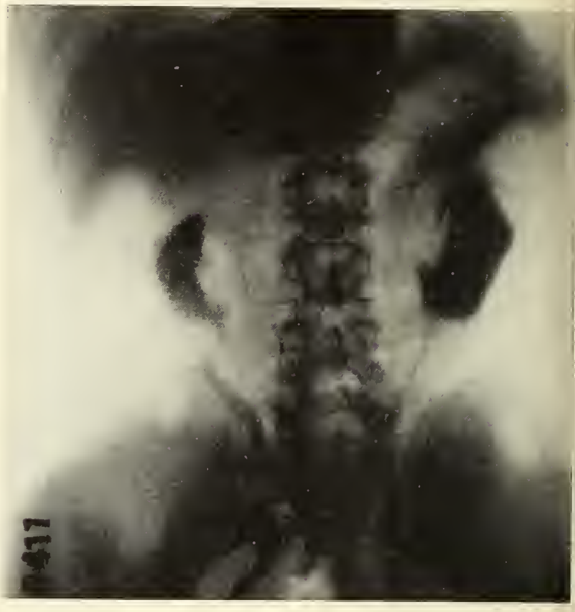


Fig. 10. (Case 4.) Bilateral pyelograms before operation. Note the typical features of horseshoe kidney: low position, long axis oblique toward midline below, under-rotation of lower poles with inferior calyces extending medially. Grade 2 hydronephrosis, more marked on left than on right. Calculus shadow left renal area, shown in Figure 9, included in pelvis.

Diagnosis

A mass representing the isthmus of a horseshoe kidney may be felt in the midline of the abdomen near the level of the umbilicus crossing the vertebral bodies transversely and transmitting the aortic pulse. (Such a mass was indefinitely palpable in two of the cases reported here but was not noted until after the urographic examination had been made.)

In the presence of well marked hydronephrosis incident to the anomaly, one or both sides of the horseshoe kidney may be palpable. Such a palpable kidney with long axis oblique toward the midline below instead of oblique toward the midline above would arouse suspicion. If the abnormal axis were clearly made out the isthmus also would be palpable. Absence of normal mobility of a palpable kidney might be suggestive of horseshoe kidney even though its exact configuration and axis were not made out but free mobility does not preclude the condition, for contrary to current impression the horseshoe kidney may be decidedly movable.

The so-called Rovsing sign, pain or aggravation of pain felt on bending backward with ventral extension of the spine, is very inconstant. (It was not present in any of the five cases reported here.)

A positive diagnosis of horseshoe kidney can only be made by urography and usually makes strong demands on the competence and experience of the interpreter of the findings.

The plain urinary tract radiograph with the kidneys and ureters not filled with contrast medium may be of some assistance by outlining the isthmus or at least demonstrating the abnormal direction of the long axis of the kidneys and absence of lower pole outlines.

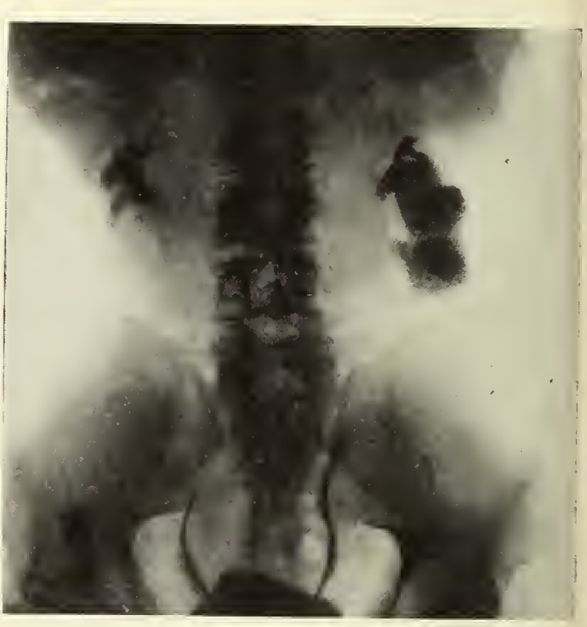


Fig. 11. (Case 4.) Bilateral pyelograms after operation; division and resection of isthmus, removal of left renal calculus, left nephropexy. Compare left pyelogram with Figure 10 and note the absence of important features of horseshoe kidney. Position slightly higher, long axis oblique toward midline above, somewhat increased rotation of lower pole. Slight decrease of pelvic dilatation chiefly evident in reappearance of cupping of minor calyces. Right pyelogram poorly filled and incapable of interpretation.

The definite diagnostic criteria by which the condition can always be recognized are found in the pyelo-ureterogram. Certain features of the pyelo-ureterogram

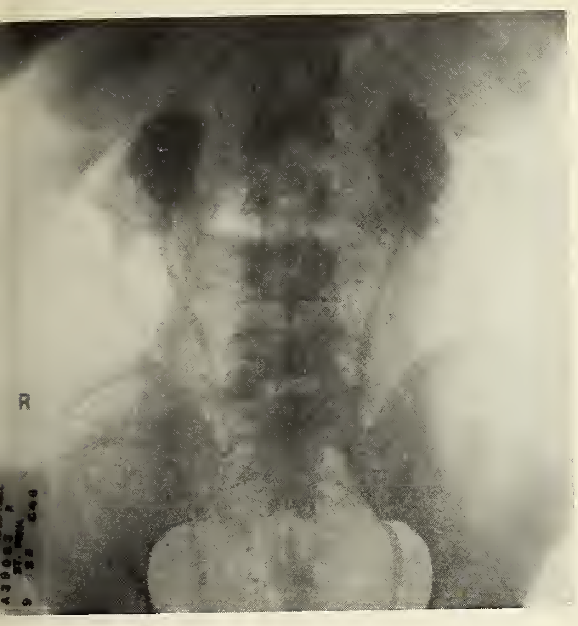


Fig. 12. (Case 5. Right flank pain, persistent, severe; left lank pain, occasional, not severe.) Bilateral pyelograms. Note he typical features of horseshoe kidney: slightly lower than ormal position, long axis oblique toward midline below, underotation of lower poles with inferior calyces extending medially. rade 2 hydronephrosis.

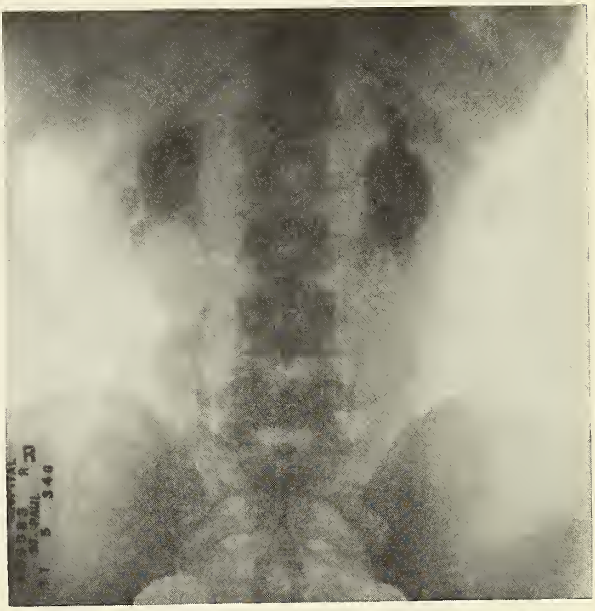


Fig. 13. (Case 5.) Bilateral pyelograms after operation: division and resection of isthmus and right nephropexy. Compare with Figure 12 and note that the right pyelogram no longer presents the typical features of horseshoe kidney. Long axis oblique toward the midline above, normal rotation of lower pole with calyces extending laterally, slight decrease of pelvic dilatation. Left pyelogram still shows the typical features of horseshoe kidney.

of the normally formed kidney are constant and rarely are distorted by disease. These same features are regularly and characteristically altered in the pyelo-ureterogram of the horseshoe kidney. Alterations of these features occur in consequence of the interference the lower pole fusion offers to ascent, rotation and axial deflection of the kidney during its migration. The abnormal features of the horseshoe kidney pyelo-ureterogram are: (1) low position, (2) inferior calyces extending dorsally or medially from pelvis, (3) uretero-pelvic junction on ventral surface instead of at medial border of pelvis, (4) ureter overlying pelvis and crossing the abnormally directed inferior calyces, (5) long axis oblique toward the midline below (line drawn through the tips of the superior and inferior calyces).

A well filled unilateral pyelo-ureterogram made with proper radiographic technic usually contains sufficient evidence on which to make the diagnosis. However, with a pyelo-ureterogram on only one side it may not be possible to differentiate between horseshoe kidney and unilateral fused kidney (so-called "tandem kidney" or "crossed dystopia"). For positive diagnosis and satisfactory demonstration of relations bilateral pyelo-ureterograms should be made.

The poor filling that obtains with excretion pyelo-ureterograms made by intravenous injection of the contrast medium may render them inadequate for positive identification of the condition. Absence of filling of some calyces frequently occurs with this method. It is evident from the foregoing discussion of diagnostic criteria that outlining the inferior group of calyces to show their abnormal medial direction and the reversed long axis of the kidney is essential. Also good filling of the ureter, which rarely obtains in excretion pyelo-ureterograms, is necessary to show its abnormal relationship to the pelvis and inferior calyces and the abnormal position of the uretero-pelvic junction.

Method of Operation

The motion picture film will illustrate the method of operation and details of the procedure need not be described.

There has been considerable discussion concerning the incision to be employed, and particularly the comparative advantages of transperitoneal and extraperitoneal approach to the horseshoe kidney. In all of our cases the usual flank incision below and parallel to the twelfth rib extending from the anterior border of the sacrospinalis muscles well forward into the abdomen with an entirely retroperitoneal approach has been employed and has been found entirely adequate. Because of the impediment from loops of bowel, mobilization of the colon and opening the posterior parietal peritoneum, it would appear that transperitoneal approach by way of a vertical abdominal incision would be a great handicap. Besides giving less technical facility it carries the risk of peritoneal infection. The retroperitoneal approach is safer and permits the whole mass of intraperitoneal structures to be displaced toward the midline, opening a large cavity around the kidney.

When the half of the kidney on the side of operation has been shelled out of its investing fat and perirenal fascia, as in the ordinary kidney exposure, traction on the lower fused pole will draw the lower extremity of the opposite kidney across the midline, providing perfect facility for division of the isthmus. The division is made between two rows of mattress sutures which control bleeding from the cut surfaces. The dividing incision is made in vertical direction and a little to the opposite side of the midline of the isthmus.

It is important that the half of the divided kidney on the side of operation be accurately positioned by fixation with its upper pole well in against the vertebral bodies and its lower pole well out lateralwards so that the ureter in approaching the pelvis does not lie across the lower pole or divided isthmus. If these relations cannot be effected because of the medial extension of the lower pole and isthmus, resection of the lower extremity of the divided kidney may be required.

Summary of Cases

Four of the five patients were women all in the second or third decades. One was a man aged thirty-eight. In all cases the chief complaint was pain and in most instances its character was fairly typical of renal origin. In all of the cases, obstruction and varying degrees of pelvic dilatation were demonstrated, and in some, varying degrees of upper tract infection and pyuria. In all cases operation was undertaken with relief of pain its chief object. In all cases this object has been fully attained, the patients having complete relief of painful symptoms. It should be noted, however, that in two cases of unilateral pain (Case 1 and Case 2) division of the isthmus and relief of pain on the side of operation was followed by development of identical pain on the opposite side and that in these two cases correction of the abnormal position of the opposite half of the horseshoe kidney by a second operation gave complete relief of this pain. In one case (Case 5) the pain, originally bilateral, has been relieved on both sides by division of the isthmus and nephropexy on the side of operation. In each of the other two cases of bilateral pain (Case 3 and Case 4) division of the isthmus and fixation on the side of operation has given relief of pain on this side while pain on the opposite side persists and nephropexy on the second side remains to be made.

In conclusion it may be said:

1. The anomaly horseshoe kidney without other pathologic change except the slight pelvic dilatation often accompanying it may produce pain.
2. Pain of such origin may be relieved by operative division or division and resection of the isthmus of the horseshoe kidney.
3. An appreciable number of such cases are identified as cases of horseshoe kidney and the opportunity to afford relief by surgery is neglected.
4. Indications for operative division or resection of the isthmus of the horseshoe kidney are: pain definitely originating in the horseshoe kidney or obstruction with pelvic dilatation and demonstrable progressive renal function impairment.
5. Five cases of horseshoe kidney with pain due to the anomaly and completely relieved by operation are reported in summary.
6. The anomalous condition may be fully corrected and normal anatomic relations established by operation.
7. The surgical procedure is safe, is accomplished with no undue difficulty and when properly performed yields satisfactory results both as to anatomic correction and relief of subjective symptoms.

Discussion

Dr. A. C. Strachauer (Minneapolis): Dr. Foley has given us an excellent presentation of his subject and the motion picture was certainly very well done. His graphic demonstration of the anatomical interference to the ureter by the isthmus appears to me to be a sound basis and indication for the division of the isthmus. While I have operated upon a number of horseshoe kidneys, I have never personally had occasion to perform the operation as described. Dr. Foley may be interested in knowing that the late Dr. James Moore nearly a quarter of a century ago divided the isthmus in a horseshoe kidney upon a Northwestern Hospital nurse. In addition to pain, she complained of a throbbing sensation which I understood was completely relieved by the operation.

Dr. Foley (in closing): I have nothing in particular to add. Dr. Wright's account of the report from Belgrade of thirty of these cases is impressive. He did not definitely indicate that they were operations for division of the isthmus. Operations on the horseshoe kidney have been reported many times. They have been undertaken for stone, for tuberculosis and for other conditions. Usually a conservative procedure, such as removal of a stone or possibly removal of one side of the horseshoe kidney, has been reported. Division of the isthmus is not so frequent, only eleven cases having been reported.

For certain parts of the operation a para-rectus incision would be helpful; for other parts it would be a handicap. The flank incision is entirely adequate for the whole procedure.

Dr. Moore's division of the isthmus so long ago, as mentioned by Dr. Strachauer, is interesting. Dr. Moore is not the only one to have divided the isthmus and failed to report it. From personal communication with other surgeons I know of three or four other such cases.

Prior to report of these five cases presented tonight there were no American cases reported and I am able to find in the literature a total of only eleven reported cases, all of them from Europe.

I am sure that the frequency of horseshoe kidney is not fully appreciated and that it is not generally known that the symptoms produced by the condition and the impairment of renal function caused by it are capable of relief by the operation I have described and illustrated in the motion picture.

The meeting adjourned.

R. T. LaVake, M.D., *Secretary.*

TRANSACTIONS *of the* MINNEAPOLIS SURGICAL SOCIETY

ANNUAL SYMPOSIUM ON FRACTURES

Tuesday, December 11, 1934

The President, Dr. Martin Nordland, in the Chair

Dr. Martin Nordland.—As President of the Minneapolis Surgical Society, I wish to welcome you here tonight.

It is evident from the large number present that our annual Fracture Program appeals to many members of the profession. This is the second year that we have devoted one of our eight annual meetings to the consideration of fractures.

The problem presented by the increasing number of fractures is becoming more and more important to the surgeon. Our Committee on Fractures has worked hard to prepare a program for you. They have attempted to present the subject in a practical manner. The Committee Chairman, Dr. R. R. Cranmer, deserves a great deal of credit for the effort he has made in building this program.

The Chairman will introduce each speaker and I am very pleased to present Dr. Cranmer, who will now preside—Dr. Cranmer.

Dr. R. R. Cranmer (Chairman).—I first wish to welcome the visitors at this meeting and invite and urge them to participate in the discussion of the papers to be read. We have visitors who have traveled many miles to attend, men from South Dakota, Wisconsin and northern Iowa, as well as from all parts of our own state. We hope that they will feel the time well spent. The attendance is evidence of the wide-spread interest in the subject of fractures. This interest is stimulated by several factors both within the profession and outside of the profession.

The first factor is the inherent desire of all physicians to improve their knowledge, realizing the practice of medicine is, in reality, the study of medicine.

Another stimulus is the rapid advances that have been and are continually being made in the treatment of fractures, among which might be mentioned skeletal traction, functional treatment, improved methods of determining proper approximation and advances in operative treatment.

Third, the stress laid on fracture treatment by the various national medical organizations, such as the American College of Surgeons, has had its effect in stimulating interest. Dr. Scudder, who for years was Chairman of the Fracture Committee of the College, has visited most of the clinics of the larger cities of the country and correlated the activity along this line. The effect of his work and that of Speed, Cotton, Böehler of Vienna, and many others has been to increase interest in fractures throughout the entire profession.

Fourth, the increase in malpractice suits based on fracture treatment and the compensation law has had its effect.

Now, because of the lateness of the hour, we will proceed at once to the presentation of the papers, after the completion of which the meeting will be thrown open for general discussion.

TREATMENT OF FRACTURES OF THE OS CALCIS

George R. Dunn, M.D.

Fractures of the os calcis occur quite frequently and are usually due to a fall from a height in which the individual alights on the heels. They may be single or bilateral. These fractures usually result in a prolonged period of immediate disability and a considerable amount of residual disability.

The efficient treatment of fractures of the os calcis, I believe, is definitely handicapped by the fact that the patient, as a rule, does not appreciate the seriousness of the fracture, the prolonged disability which it will cause, and the likelihood of resultant impairment of function. The deformity is not obvious to the patient. He is able to use the foot to a certain extent by stepping on the toes and as a general rule does not feel that the injury has been serious. A large majority of patients would probably refuse to submit to the more radical forms of treatment such as the method advised by Böehler.

Some splitting types of fractures and other more simple forms of fracture of the os calcis require comparatively little treatment except protection from weight bearing and proper support of the feet for early weight bearing. In a vast majority of the cases, however, immediate active treatment is indicated. The most favorable time to treat any fracture would seem to be immediately after the injury and before swelling has developed. A very considerable amount of swelling develops quickly in some fractures of the os calcis and in certain instances where the swelling is already established it is advisable to allow the swelling to subside before proceeding with active treatment.

The results of treatment of fractures of the os calcis are, on the whole, probably not good. Some poor results at least are probably attributable to failure to correct the deformity, too long immobilization, and the failure to instigate early movement as we do in other fractures involving joints. The os calcis has multiple articulations and the lateral clearance is comparatively slight. Flattening of the longitudinal arch and eversion of the foot frequently result from improper correction of the deformity. The important steps in the treatment would seem to be:

1. Immediate reduction of the deformity as thoroughly as possible and, in event swelling has occurred,

the reduction of the deformity as soon as the swelling has subsided.

2. Early movement without weight bearing to prevent excessive callus formation.

3. Use of the foot with proper support when x-ray indicates sufficient union.

In order to effect a proper reduction of the deformity as far as possible, one must carefully evaluate the deformity by x-ray examination and manual examination, testing the range of movement in the subastragaloid joint. The x-ray plates should include anteroposterior and lateral views of the foot and ankle and special plates of both ora calcis.* We notice particularly:

1. Broadening of the os calcis especially beneath the lateral malleolus where this most frequently occurs.

2. Flattening of the contour of the os calcis (the so-called "Tuber-Joint" angle of Böehler).

3. Malposition of the posterior portion of the os calcis.

4. Involvement of the subastragaloid joints in the fracture line and the range of movement permitted at the subastragaloid joint, that is, the lateral movement.

Certain types of fracture of the os calcis have been described but on the whole the variety of fracture occurring is quite variable. Broadening of the os calcis (which usually occurs below the external malleolus) frequently leads to impingement of the os calcis on the external malleolus or on the underlying soft parts. Eversion of the foot becomes painful. It is highly important to correct this deformity. In recent fractures it may be possible to do this under anesthesia by simply molding the bone with the fingers or by the use of the fist with the foot resting on a sandbag. In the more difficult cases a mallet with a felt pad over the os calcis may be used or if desired a clamp of the Böehler type. The reduction of this deformity should be sufficient to permit a free range of movement at the subastragaloid joint for one can not expect more lateral movement to develop at a later date than is obtained at the original reduction. In old cases where union has already occurred and this deformity has not been corrected, it can be relieved somewhat by an operative procedure and removal of a certain portion of the bone. Once the broadening has been reduced, excessive callus formation can be best guarded against by early movement without weight bearing. In many cases of fracture of the os calcis, execution of the lateral movement through the full range can be commenced at once. In cases where the fracture is badly comminuted a short period of fixation without movement may be desirable, but even in the more severely comminuted cases, movement can frequently be started in ten days or two weeks without weight bearing. Early inversion and eversion of the foot are nearly as important, I believe, in fractures of the os calcis as abduction of the arm is in the treatment of fractures of the tuberosity of the humerus.

Flattening of the os calcis is frequent. This may be corrected in many cases by mere manual manipulation, drawing downward on the posterior portion of the os calcis while pressure is exerted over the sole of the foot either with the hand or some more solid object. Slight flexion of the knee during this procedure tends to relax the tendon of Achilles. In recent fractures where no shortening of the tendon of Achilles has occurred, it has been my experience that there has been very little tendency for the tendon to contract and reproduce the deformity during the short period necessary for early bony union to occur. Slight flexion of the knee during the reduction and during the period of healing is usually sufficient to prevent this complication. In cases where manual correction of this deformity is not possible, tongs may be inserted into the os calcis, the deformity reduced by traction, the tongs removed and a sterile dressing applied. A pin passed through the os calcis or anterior to the insertion of the tendon of Achilles serves the same purpose. Where there is a considerable flattening of the os calcis and a tendency for the deformity to recur, it is sometimes possible after correcting the deformity to gently impact the fracture and thus prevent recurrence. In an occasional case, operative lengthening of the tendon of Achilles may be necessary in order to correct the deformity. In the more difficuult cases traction may be applied by passing a pin through the os calsis or by fixation in plaster with a pin through the os calcis or with two pins as described by Böehler, one through the os calcis and the other through the tibia. There are obvious objections and hazards to inserting a pin through the fractured os calcis.

Position may be maintained by temporary support with plaster, either in the form of a cast or molded splint or in a Pott's splint depending on the seriousness of the fracture. In those cases where early movement is possible a removable support allows the foot to be put through the movements of inversion and eversion several times a day. Movement should be commenced as soon as possible and weight bearing with proper support of the arch when sufficiently firm union has developed.

In fractures of this type, attention must be given to the position of the posterior fragment as lateral or internal angulation may lead to faulty weight bearing, inversion or eversion of the foot. Comparative views of the two bones are of great importance.

An occasional fracture of the os calcis is sufficientlv bad to warrant operative exposure and reduction of the fragments and treatment by impaction or other methods of fixation, usually accompanied by lengthening of the tendon of Achilles. In old cases where firm union has been established, the removal of excessive callus, especially beneath the external malleolus, may be beneficial. In some badly comminuted fractures, immediate subastragaloid arthrodesis is indicated. In a certain group of cases that remain painful with use, obliteration of the subastragaloid joints improves the usefulness of the foot. Radical procedures are, however, not frequently necessary if a reasonably good correction of the deformity is obtained and early movement commenced.

---

*Take laterals with the patient lying with the outside of the foot on the plate, then turn the patient on the stomach with both feet together and with the feet dorsally flexed as far as possible, put the casette on the soles of the feet and angle the ray at 50° going through the tendon of Achilles toward the soles of the feet.

In summary, a few fractures of the os calcis are relatively simple and require comparatively little treatment except protection. Some fractures are sufficiently serious to justify a method as elaborate as the so-called Böehler method, an operative correction, or a subastragaloid arthrodesis. The majority of the fractures, however, will give fairly good results if proper reduction is effected, early movement instigated and proper support provided through the early stages of weight bearing.

FRACTURES OF THE NECK OF THE FEMUR*

E. A. Regnier, M.D.

The subject assigned to me well lends itself to periodic review. The limited time allotted for this topic permits only a brief outline of the fundamentals in diagnosis and treatment of fresh fractures only.

The Whitman method of treatment has proven so efficacious that it is now recognized by surgeons the world over. Any departure from the Whitman method is usually aimed at shortening the convalescence. Other methods, whether by open operation or internal fixation, accomplish only a reduction and involve much risk.

In the past we have been much concerned with factors which influence bony union, *i.e.*, constitutional disease, age, joint fluid, absorption of bone, etc., to the degree that they have almost become mental hazards. These are all factors to weigh carefully and console one in an hour of adversity but the real crux of the situation is accurate reduction and fixation. Given an accurate reduction and fixation, all fractures should heal.

A. W. George and R. D. Leonard have focused our attention on the importance of lateral views of fractured necks of femurs and this has contributed most valuably to our present treatment. It is the purpose of this presentation to show, by slides of a series of cases at the Minneapolis General Hospital, how lateral views of these fractures have enabled us to obtain much more accurate reduction, better end-results and shortened convalescence. Failure of complete and accurate reduction of the neck of a femur can be proved by lateral views together with stereoscopic anterior-posterior views but by neither view alone.

To accomplish a reduction of an intracapsular fracture certain conditions and equipment are necessary. In the first place, the fracture must be recent, in other words one not more than a few days old, ten at the most. Secondly, suitable x-rays must be available included a curved cassette; thirdly, proper anesthesia; and fourthly, a Hawley table, plaster, padding and other essentials to insure proper and comfortable fixation.

Our experience has taught us that a low bilateral spica is preferable to the unilateral spica. This plaster is applied from the toes up to and including the pelvis and the fractured side and from the knee on the good side. This type of plaster allows for more freedom of motion of the body and permits the nursing staff to turn the patient or to prop him up almost to a sitting position. This type of plaster immobilization prevents any tilting of the pelvis and still permits much activity for the patient. It is essential that plasters fit quite snugly. In the event of marked muscular atrophy and shrinking of the extremities sufficient to have the cast appear loose, it should be replaced immediately. Many a perfect reduction is lost by an ill fitting plaster after three or four weeks.

The first maneuver in accomplishing reduction is one of traction in slight abduction and flexion of the hip. Next the thigh is internally rotated. This is the position that most men fail to obtain, *i.e.*, marked internal rotation. In my opinion, a marked degree of internal rotation is just as essential to success as abduction. When asked how much internal rotation to obtain, the best answer is: to get as much as possible. Having produced internal rotation and corrected for shortening the thigh is now abducted moderately or more, the hip extended and at this stage an attempt at impaction should be made. This contribution by Cotton is very valuable and should always be tried. Having tried artificial impaction, the fracture is ready for plaster immobilization, but before this is done an x-ray is taken both in the anterior-posterior and lateral positions. If the position of the fragments is not as near perfect as it is possible to obtain, the fracture should be remanipulated until the position is satisfactory. The above described double spica is then applied and the patient returned to bed and heat is applied to dry the plaster.

The after-treatment of this type of fracture varies greatly with different surgeons. We have been keeping our cases in plaster for twelve weeks heretofore. During the past year we have run a series of cases which were immobilized a shorter time. In fact we have proven bony union in less than eight weeks in several instances. It is too early to make positive statements but it is my opinion that with our present x-ray checkup as to position of fragments after reduction, the period of convalescence will be materially shortened.

An x-ray should be taken every ten days to two weeks while in plaster. Any deviation from the original position calls for correction and change of plaster.

After the plaster is removed every effort must be made to rehabilitate the extremity by physiotherapy, heat, massage and active motion, etc. There should be no weight bearing before the fourth or fifth month and then not without the protection of a well fitted caliper. The caliper must be accurately fitted and diligently worn for from six to twelve months as the case indicates. According to Phemister, there probably never would be absorption of the head if weight bearing were put off long enough, or what may appear to be a dead head will regenerate if protected from the strain of weight bearing. An ill-fitting caliper is worse than nothing but, conversely, a properly fitted caliper is almost as useful as a leg and permits solid bone to form while the patient is active. The error with calipers comes from discarding them to soon. We have seen slipping at the fracture site six months after discarding a caliper when the use of it for six to eight weeks longer would have prevented the displacement. Passive motion probably does more harm than good and should never be used.

---

*Extracts from paper to be published elsewhere.

Summary

Lateral views of fractures of the neck of the femur taken with a curved cassette have greatly added to the proper reduction of these fractures.

Operative treatment only accomplishes a reduction which can be done with more safety by the Whitman method and should be used when the latter method fails.

Given accurate reduction, checked in the anterior-posterior and lateral views, with proper fixation, all fractures should unite regardless of age, health or condition of the bone.

A series of lantern slides of fractures of the neck of the femur were shown to illustrate various types of fractures before and after reduction.

FRACTURES OF THE UPPER END OF THE TIBIA INVOLVING THE KNEE JOINT

R. C. Webb, M.D.

Fractures in general may be divided into three classes: (1) those in which a good result may be expected with conservative treatment and simple equipment; (2) those which require special treatment or special equipment in order to obtain a good result; (3) those in which a poor result will be obtained regardless of treatment or equipment.

Fractures of the upper end of the tibia involving the knee joint occur when a person is struck by an automobile bumper at about the knee joint level, is tackled in football or receives similar trauma about the knee joint, or falls from a considerable height.

Hemorrhage into the knee joint always occurs with these fractures. The connective tissue elements surrounding the joint become thickened, adhesions may result in and about the joint, the articular surface of the tibia is widened, and the fragments are forced into abnormal situations. The attachments of the crucial ligaments may be disturbed, the semilunar cartilages may be injured and fragments of bone may become foreign bodies in the knee joint.

The symptoms produced are swelling of the knee joint, pain on motion of the joint and instability and weakness. Diagnosis of a fracture of the upper end of the tibia is easily made in many cases by inspection, but a satisfactory and complete diagnosis can only be made with the x-ray. The diagnostic study of this fracture should be continued with the x-ray until the best possible result has been obtained and is assured. The prognosis in these fractures should always be guarded, but the surgeon should understand that active measures must be carried out to insure a good result. This fracture must be promptly and adequately treated whenever it is found.

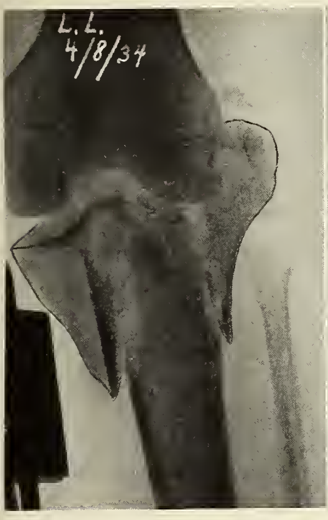
The treatment should begin at the earliest possible moment with the application of a Keller-Blake hinged half-ring transportation splint. "Splint 'em where they light." Collins presented a series of cases treated conservatively with fairly good results. Eliason obtained good results in 70 per cent of his cases treated conservatively. Cubbins felt that 50 per cent of the cases required something more than conservative treatment and presented a method of nailing the fragments together. In all cases where the knee joint is swollen, the joint should be aspirated because of the hemarthrosis.

The great tendency toward limitation of motion of the knee joint calls for early motion during the treatment. Fixation of the extremity in plaster must not be used for too long a time, even in case of a slight fracture. A useful joint may eventually be obtained, but the period of convalescence will be unnecessarily prolonged. The application of suspension and adhesive plaster or skeletal traction permitting early motion will bring about good results in many cases.

Skeletal traction by means of a wire through the os calsis and from fifteen to twenty-five pounds of weight as indicated, according to the x-ray control of the treatment, is very efficient. The extremity can be suspended in a Thomas splint with a Pearson attachment, and the traction ropes may pass over two pulleys at the end of the Pearson attachment. Part of the weight is allowed to hang directly downward and the other rope passes upward and over a pulley directly above on the overhead frame. In this manner the traction is continuous while the patient is exercising the knee joint, and the leg is constantly supported in the hinged Pearson attachment.

We have recently treated five patients with fractures of this type by placing a bolt with washers and nut through the upper end of the tibia from side to side. The bolt is applied by making incisions and drilling through the bone and then inserting the bolt in the drill hole and tightening it under x-ray guidance in the operating room, and then removing the protruding portion of the bolt with a bolt cutter and covering the two ends by closing the incisions. The patient is then returned to bed and placed in suspension as described above with or without traction according to whether or not there is more than a simple splitting of the head of the tibia which would require traction in order to maintain position. Early active and passive motion under the control of the patient is started at once and kept up throughout the treatment. With the fragments firmly bolted in place and alignment of the tibia maintained by traction if necessary, there is nothing to be lost and much to be gained by early motion. Weight-bearing is not allowed until the x-ray shows satisfactory healing. In none of our cases has it been necessary to remove the bolt.

The accompanying illustrations (Figures 1 and 2) clearly show the advantage obtained with the proper use of the bolt.



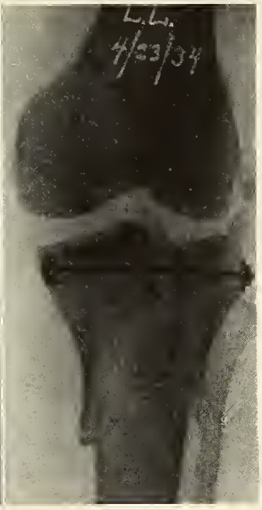


Fig. 1 *(left)*—Extremely comminuted fracture of the upper end of the tibia involving the knee joint with wide separation of the condyles, and the shaft of the tibia driven up between the condyles to the level of the lower end of the femur. Before treatment.

Fig. 2 *(right)*—After the application of skeletal traction combined with the application of a bolt through the tibial condyles. Note that the condyles have been restored to their normal relationship and the shaft of the tibia has been pulled distally by the skeletal traction to its normal position.

Conclusions

Fractures of the upper end of the tibia involving the knee joint are potentially serious fractures.

Prompt and accurate replacement of the fragments by either closed or open methods is indicated.

Early motion and late weight-bearing should be the rule in fractures of this type.

When the fracture is severe the bolting of the fragments by open operation affords the simplest open method of retaining the fragments securely in place and permits early motion, thereby assuring increased function and shortening of the period of disability.

PATHOLOGICAL FRACTURES

R. G. Allison, M.D.

(By invitation)

The term "pathological fracture" to most of us immediately conveys the idea of either primary or metastatic malignancy of bone. There are, however, numerous types of benign tumors and local and systemic bone diseases which result in pathological fractures.

The early recognition of the fact that a given fracture is pathological is of extreme importance for several reasons: (1) that a guarded or unfavorable prognosis may be given if malignancy is the underlying cause; (2) that appropriate treatment may be carried out when the bone pathology is non-malignant in character; (3) that in metastatic malignancy the primary tumor be located if possible. From a medicolegal standpoint in liability cases and for the protection of the attending physician or surgeon in all cases, this is of extreme importance.

A great number of pathological fractures are not recognized as such early. The underlying pathology, particularly early metastatic malignancy, is often so slight and so completely masked by the fracture lines as to be indistinguishable on the plates. Whenever the trauma is slight, or not of a type to produce a given fracture, with negative x-ray plates the prognosis should be guarded and follow-up plates made. The underlying pathology, if slow growing, may not become visible until weeks and sometimes even months later.

Metastatic tumor of bone is often mistaken for primary malignancy. This is particularly true of hypernephroma. This is the one malignant tumor above all others which commonly gives a single large bone metastasis resulting in pathological fracture.

The location of the primary tumor is often difficult in metastatic malignancy of bone. Some metastases from carcinoma of the breast and practically all metastases from carcinoma of the prostate are recognizable as such on the x-ray plates.

Giant cell tumor, bone cyst, osteomyelitis, Paget's disease, multiple myeloma, all common causes of pathological fracture, usually give typical findings on the x-ray plate.

With the exception of osteomyelitis the occurrence of pathological fracture is generally the first symptom leading to a diagnosis of the above named diseases.

Hyperparathyroidism is seldom diagnosed until a pathological fracture occurs. The typical x-ray findings with the associated alterations in the calcium and phosphorus metabolism make the diagnosis obvious.

In conclusion, may I recapitulate:

1. A single metastasis resulting in a fracture is usually hyper-nephroma.

2. Malignant and benign types of bone pathology usually give typical findings in long bones, but are extremely difficult to differentiate in the flat bones.

3. Extensive generalized bone disease is commonly unrecognized until a pathological fracture occurs.

4. Whenever a fracture occurs with little violence and the x-ray shows no underlying pathology, follow-up plates will usually reveal the pathology weeks or even months later.

PROGNOSIS IN FRACTURES OF THE SKULL

Arthur A. Zierold, M.D.

In cases of head injury we are not concerned with injury to the scalp nor injury to the bone, but rather with the injury to the brain. We have been accustomed to estimate the extent of brain injury by several various clinical phenomena until a veritable formula has developed, which has existed unchanged for a number of years. Recent studies in the clinical behavior of patients with head injury together with studies of the late effects as well as extended and detailed post-mortem examination suggest that some of the signs which we have considered in the past as prima facie evidence of brain damage can no longer be safely considered as such. No new evidence of value has been added in recent years, but there appears to be a general disposition on the part of the profession to revalue the findings in head injuries in order to make a more accurate estimate with regard to prognosis and to form a basis for logical and successful treatment. It goes without saying that the nature of the head injury presents some evidence by which we may in a general way estimate the probability of brain damage. That is to say, the presence of skull fracture is of importance inasmuch as it is evidence of a severe injury to the cranium and as might be logically expected a severe injury more frequently is followed by brain damage than not.

The one outstanding constant and specific evidence of brain dysfunction is unconsciousness. Unconsciousness immediately following a head injury is prima facie evidence of the presence of brain damage, but not necessarily evidence of the severity of the damage. The length of time over which unconsciousness persists is, however, not only evidence of an extensive brain damage, but is also evidence of its severity. To make this somewhat clearer, it is quite possible to sustain a severe laceration of a portion of the brain without an attending period of unconsciousness. On the other hand it is not possible to have even a minor degree of brain damage without unconsciousness, providing it has involved the greater portion of the brain. At this point it is well to note that unconsciousness itself must be differentiated from aphasia, inasmuch as aphasia is evidence of localized cortical damage and is not true unconsciousness. An unconscious individual will not respond in a purposeful manner to any stimulus, whereas an individual with an aphasia will respond usually with some purposeful movement.

Any irregularity in the period of unconsciousness is not so much evidence of the extent of brain damage as the evidence of recurring hemorrhage and increased intracranial pressure. The best example is the period of unconsciousness following the free interval which obtains in head injury attended by rupture of the middle meningeal artery. The late occurring period of unconsciousness is not evidence of brain damage, but merely evidence of increased intracranial pressure. Delirium and disorientation if persistent and following a period of unconsciousness are usually evidences of extensive brain damage. For a long time vomiting has been considered evidence of brain damage. In my experience vomiting is of no value as an index to brain damage. It occurs as frequently in trivial injuries as it does in severe ones and unless it occurs late in the course of observation it is of no importance. When, however, it does occur late it is not an evidence of brain damage, but rather evidence of sudden increased intracranial pressure.

One of the outstanding signs of brain damage with a serious prognosis as to life is incontinence; usually bladder incontinence. When this occurs the outlook is grave. It is usually the evidence of extensive and severe damage to the substance of the brain.

In the past the eye signs have been carefully observed and considered of prime importance. This, in the light of recent experience, is only in part true. The pupillary reflexes are of little value in estimating the extent of brain damage. If, however, there is fixation of the eyeball and also fixation of the pupils, this combination of events is usually evidence of extensive brain damage. The degree often depends upon the persistence of these signs. Conjugate deviation of the eyes is usually evidence of localized cortical damage and not the evidence of extensive brain injury although it may appear with hemorrhage into the ventricle. Examination of the fundi is done routinely by many men, but is probably of the least value in determining the extent or severity of brain damage. When papilla-edema does occur it is evidence only of increased intracranial pressure, which in itself is not evidence of brain damage. Monocular disturbances either of the pupil or of the extra-ocular movements, are not important signs of brain damage, but rather the evidence of peripheral third or sixth nerve injury.

In the past much stress has been laid upon the evidence presented by spinal puncture. The finding of blood in the spinal fluid is common to many cases of head injury and in itself is only evidence of hemorrhage. It is not evidence of severe or extensive brain damage. Likewise, the intraspinal pressure is not a matter of grave concern. It is possible to sustain a severe injury to the brain without this being attended by a marked rise in intraspinal pressure and likewise it is possible to have a trivial injury to the brain attended by a marked rise in intraspinal pressure. Abnormal intraspinal pressure is the evidence of hemorrhage either without the dura or beneath the dura or in the substance of the brain. It is not in itself evidence of brain damage. This is contrary to the usual teaching but is the result of a carefully studied series at the Minneapolis General Hospital and is the opinion of several men such as Richie of London, Connors of New York and others.

It is also the custom to make careful and persistent studies of the pulse and blood pressure. Examination of a large number of records carefully made following head injury shows that variations in pulse and blood pressure are not evidences of brain damage, but rather evidence of intracranial pressure. Furthermore, it is only when the intracranial pressure approximates that of the blood pressure that there is any marked and definite change in the pulse rate or in the blood pressure. This occurs in our experience in only about 1 or 2 per cent of the cases. The terminal rise of pulse and drop of blood pressure is the evidence of impending death which is common not only to brain damage resulting from head injury, but also to the nervous exhaustion terminating other diseases. Inasmuch as it occurs only a short time before death and is really part of the terminal state it cannot be considered as one of the early signs in estimating brain damage.

Alterations in the respiratory rate and depth are of a great deal of value as evidence of medullary damage, particularly in the absence of increased intraspinal pressure. Of the clinical signs which may have to be obtained from examination of a chart, respiratory disturbances may be taken as evidence of serious brain damage. This is particularly true if cyanosis is present. This is also true with regard to the temperature. A marked and persistent rise of temperature is one of the best signs of extensive brain damage. This is usually attendant upon hemorrhage into the substance or hemorrhage into the ventricle.

The neuromuscular signs such as paralysis, spasticity and disturbed reflexes present little of value directly following a head injury. At this time these cannot be taken as evidence of the extent or severity of the brain damage. After a lapse of several days the persistence of paralysis or spasticity is of considerable value as evidence of localized brain damage.

Briefly then the outstanding criteria in the estimate of brain damage are: unconsciousness, incontinence, respiratory irregularity, and persistent fever.

FRACTURED VERTEBRÆ

W. D. White, M.D.

Fractures of the spine are of importance for two reasons: (1) because of the effect the injury may have on the spine as a supporting structure; and (2) because of possible injury to the spinal cord. You will recall that the spinal cord is protected by the bony ring of the vertebræ, by dura and by the cerebrospinal fluid.

It is self-evident that, as results depend on correct treatment, recognition of the lesion is of paramount importance. Hence it is advisable to emphasize again and again the need for examination of the spine after an accident. This is true not only when direct blows to the spinal column have occurred and spinal injury is apparent but also after what might appear to be a less serious accident, or when less direct injury to the spine seems evident. I refer to such incidents as falls upon the buttocks, objects falling on the head or shoulders when the body is in a bent-over position, etc. Associated injury may absorb so much attention that a fracture of the vertebræ may be overlooked. This has been known to occur when a patient is hit by an object, receiving a fracture of the neck of the femur. That injury, being apparent and serious, requires considerable attention and a compression fracture of the vertebræ may be overlooked.

Fractures with Cord Injury

Fortunately, injury to the cord is frequently easily recognized by the presence of areas of anesthesia, muscle paralysis and other features of nerve trauma.

Practically all clinicians agree that injury to the cervical spine is very apt to be associated with cord injury and that the mortality in these cases is high. Moreover, the injuries to the cervical spine as a group constitute a large percentage of the fatal cases. Simon[5] reported during a certain period on 130 cases of injury to the vertebræ, fifty-one (37.6 per cent) being to the cervical vertebræ, and of these, twenty-seven had cord involvement. Of these twenty-seven cases, twenty-two (81.5 per cent) died. Kessler[3] points out that above the level of the fourth cervical vertebra injury is usually fatal either immediately or within six days. He further states:

> *"Below the fourth cervical vertebra:* Lesions of the fourth to the eighth cervical vertebræ involve the upper extremity. If not fatal the paralysis or sensory disturbances that result from the cord lesion may be appraised after an intervening period of six to eight months on the basis of the physiological composition of that extremity, viz.—loss of motion, strength and coördination."
>
> "Injuries to the cord in the dorsal region may result in paralysis of the abdominal muscles, bladder, rectum, and both lower extremities.
>
> "Lesions below the first lumbar vertebra cause injury to the cauda equina with paralysis of feet and peronei, loss of sphincter control and anesthesia of the buttocks and genitals."

Fractures without Cord Injuries

Fracture may occur to the neural arches, articular facets, transverse processes and spinous processes. Fracture of the neural arches, the articular processes and the spinous processes generally occur from direct violence and cord injury may or may not complicate.

Fractures of the transverse processes may occur as a result of indirect violence and more particularly of muscular action or force, and occur most frequently in the lumbar region. If not associated with other fractures the incapacity is usually only temporary. It is wise not to emphasize the importance of this fracture to the patient and not to speak of it as a broken back. Many of these cases may be treated ambulatorily. Determination of the prognosis in this type of injury will be influenced by such factors as age, general condition of the patient, etc.

Fractures of the Vertebral Bodies

We are especially concerned with treatment and results of fractures of the bodies of the vertebræ. It is in this group of cases where there may be the greatest difference of opinion. There has been some tendency to modify the classical treatment.

In the cervical region cord injury is apt to be present. If it is not, the deformity may be corrected by manipulation and traction followed by immobilization and support.

In the thoracic region the final result often is greatly influenced by early recognition and treatment. Davis,[1] in 1925, emphasized the importance of reducing the compression by manipulation. For this the patient is anesthetized, placed on a table with his face down, the ankles padded and a rope placed around the ankles and the legs raised towards the ceiling by means of this rope and a pulley, thus hyperextending the back. At the same time pressure can be applied to the site of fracture. A plaster jacket is then applied and the corrected position thereby maintained. Other maneuvers have been utilized to accomplish this reduction of compression by hyperextension.

Jones[2] of Liverpool administers a sedative hypodermically but no anesthetic is given. The patient is placed face downward with his thighs resting on one table and arms and shoulders on another slightly higher table. The body sags between the tables and hyperextension results. A plaster jacket is then applied around the hips and well up on to the trunk. Other men have described other procedures such as placing the patient's back across a sheet held between two men and allowing the weight of the extremities of the body to bend the spine backwards. I believe most men who attempt to treat these fractures will agree as to the advisability of reduction of the compression. There is, however, quite a wide variation in the opinions of these men as to the length of time the back should be immobilized and there are other differences in the management. Many surgeons follow the plan of having the patient wear a plaster cast for three months, a brace of the Taylor type three months, day and night; for the next three months the brace is worn daytime only, and then it is discarded. The patient returns to work usually at the end of a year from the time of the injury. There is now a great tendency to modify this plan as just stated. It is quite possible that, where a compression is well reduced by some such procedure as mentioned above, a cast could be safely removed at an earlier date. Some men, including Watson Jones,[2] allow an individual with a compression fracture of a dorsal or lumbar body which has been reduced, to be up and about in approximately ten days, provided a snugly fitting jacket is worn. The plaster is worn for four months. A light brace is used following its removal and the patient may be allowed to return to work in six months. Jones reported seven cases of recent fracture treated by this method. In one of these the fracture had occurred three and a half weeks previously and was complicated by paraplegia and urinary tract infection. This patient died of uremia four weeks later. In the other six cases reduction was completely successful. Anatomical reposition of the compressed vertebra was secured, with a normal range of movement.

H. E. Mock[4] of Chicago reduces the compression fracture gradually by hyperextending the patient on an adjustable Bradford frame, employing opiates for a few days as necessary. He uses a plan whereby a patient is turned over on the abdomen for a short time each day after the fourth day. The back is kept hyperextended. Physiotherapy in the form of heat and gentle massage is begun at once. The plaster jacket is applied at the end of three weeks and is removed at the end of eight weeks from the date of injury. He claims most of his patients return to work in from twelve to sixteen weeks. He is very insistent that no brace be used. He uses heat and massage and exercises before and after the cast is applied. He emphasizes the fact that the spine is made up of numerous joints and two large sacroiliac joints adjacent to it, and that immobilization of these joints is very apt to cause stiffness with subsequent disability.

The condition known clinically as Kümmel's disease, which is an aseptic necrosis and cancellous bone, may follow back injury. It is the fear of this change that has frequently caused surgeons to use prolonged immobilization. This condition, however, is rare.

There is good reason to believe that, if a compression fracture of the body of a vertebra is recognized and treated with proper and sufficient immobilization, aseptic necrosis or Kümmel's disease will not follow. As Jones[2] points out, a slight compression may occur and be shown in x-ray. It is reduced and there may be great difficulty in demonstrating the injury in a post-reduction radiogram. Therefore, a compression of the cancellous bone may occur and be reduced by manipulation or otherwise. An x-ray examination is made and no fracture is found. The individual is not given support to his back; he continues to complain of pain. He is x-rayed again later and an area of necrosis is found and Kümmel's disease is said to have developed. The belief in becoming more widespread that, if the compression is corrected, a shorter time of immobilization may be allowed.

Conclusions

A summary of the situation may be stated somewhat as follows:

Given a compression of a body of a dorsal or lumbar vertebra, early ambulatory treatment may be allowed if two conditions are fulfilled:

1. Complete correction of the compression.
2. Adequate support, *i.e.,* immobilization by means of a properly fitting plaster jacket which maintains the hyperextension.

The length of time necessary to wear the plaster jacket may vary with different patients but it is my opinion that with compression to any degree about four months support is required. This agrees with the teaching of Watson Jones. Jones would also prescribe a brace for about two months. Mock of Chicago would have his patients wear the plaster about half that time and use no brace.

In further conclusion I wish to say that I have tried to find statistics put out by men who have treated a large number of these fractures with the idea of correlating, if possible, the final result: first, with the type of treatment; second, whether or not a correction of the compression was accomplished; third, the length of time that the spine was immobilized; fourth, whether or not a brace was used; fifth, the length of time the individual had to remain away from work; and sixth, the percentage of permanent disability. Reports of this type are surprisingly rare. In fact, I could find no report that gave exactly these features. One thing seems quite certain—that the healing period and the percentage of permanent disability appear to differ in compensation cases and private patients where no medico-legal problem is involved.

Bibliography

1. Davis, A. G.: Fractures of the spine. Jour. Bone and Joint Surg., 11:133, 1929.

2. Jones, R. Watson: Manipulation reduction of crush fracture of the spine. Brit. Med. Jour., 1:300-302, (Feb. 21) 1931.
3. Kessler: Accidental injuries. Lea and Febiger, 1931, pp. 312, 313.
4. Mock, H. E.: Internat. Jour. Med. and Surg., 46:451, (Oct.) 1933.
5. Simon, H. T.: Fracture and fracture dislocation of cervical vertebræ. New Orleans Med. and Surg. Jour., 82:867-871, 1930.

FRACTURE DISLOCATION OF THE SHOULDER

George D. Eitel, M.D., F.A.C.S.

Dislocation of the shoulder complicated by a fracture of the upper third of the humerus is an injury that demands prompt and accurate treatment. Physical examination presents the appearance of a dislocation in addition to marked swelling and discoloration in the region of the upper third of the arm. A large hematoma may be present and this should make one strongly suspicious that a fracture is present. Palpation reveals increased muscle spasm and any attempt to manipulate or examine the shoulder is accompanied by severe pain and the presence of crepitus unless the fracture be impacted. The head of the humerus will not rotate with the shaft.

The mechanics of the causation of this type of injury is usually a direct force which is applied to the upper third of the humerus with the arm in abduction and the edge of the glenoid cavity or the acromium process acting as a fulcrum. The dislocation is first produced and if the force is continued a fracture follows.

Dr. Scudder stresses the point that care must be exercised in reducing a simple dislocation so that a fracture of the humerus is not produced during the manipulation and reports fifty-nine cases of fractures which resulted during this procedure.

X-ray pictures of this type of injury are of great importance and should be carefully interpreted by a capable roentgenologist. Stereoscopic plates, if obtainable, are to be preferred although a flat plate will do providing detail is present. Many times the attending surgeon examines the x-ray plate, notes the fracture and displacement of fragments, but entirely overlooks the dislocation of the humeral head. The fracture is perhaps treated with more difficulty than the average case. Further x-rays are taken to follow the progress of the fracture when the dislocation is discovered, but here I emphasize the importance of a trained roentgenologist who will examine the plate with you at the start. If a roentgenologist is not available, the surgeon should assure himself that no dislocation is present before he proceeds.

How often does fracture dislocation occur? Meyerding recently reported 114 fractures of the humerus. Sixty of these were of the upper end of the humerus, and of these, ten were fracture dislocations, or one in six. Roberts recently reviewed ninety-six cases of fracture of the upper end of the humerus from the Massachusetts General Hospital and of these, thirteen were fracture dislocations or a ratio of about one in seven.

Any type of fracture of the upper third of the humerus may accompany a dislocation and in the order of their frequency are:

1. Fracture of the greater tuberosity.
2. Fracture of the surgical neck.
3. Fracture of the anatomical neck.
4. Separation of the upper humeral epiphysis.
5. Fracture of the glenoid of the scapula.

Fracture of the Greater Tuberosity

Fracture of the greater tuberosity is the most common and causes little difficulty in reduction. Cubbins surveyed 155 cases of fracture of the upper end of the humerus and found twenty-eight cases of a fractured greater tuberosity with ten of them associated with a dislocation. With careful reduction of the dislocation the greater tuberosity is usually accurately approximated to the humeral head and is maintained by abduction of about forty-five degrees. Early massage is of great value and active motion at two weeks aids in reducing the prolonged disability due to immobilization. Open reduction of this type of fracture is never indicated.

Fracture of the Surgical Neck

Of 122 cases collected in the literature by Lyman, seventy-three were of this type. There has never been a standard type of treatment for this injury. Pasicrates in 50 B. C., in describing the injury, stated that he preferred to reduce the dislocation and then allow union of the humerus. Aristan, on the contrary, thought union should take place first. These two methods of treatment have always existed. Some cases have been reported where an effort was made to prevent union and thus establish a false joint at the seat of the fracture and others have taught that all heads must be excised, and others, that open reduction should be resorted to in all cases. The consensus of opinion today is to reduce the dislocation first and then treat the fracture.

The principal steps in the treatment of this injury are abduction, traction, and countertraction with pressure in the axilla. Care must be exercised so that the axillary vessels and nerves will not be injured. The sooner reduction is attempted after the injury the easier it is accomplished. A fracture closer to the head of the humerus is more difficult to reduce than one closer to the shaft because of the absence of muscular attachments. Bardenheur, in 1886, established the fundamental fact that traction on the lower fragment in fractures of the upper end of the humerus is transmitted to the upper fragment through the untorn periosteum and the tendon of the long head of the biceps muscle. So with the periosteum, muscles, and tendons, we are able to effect traction on the head and reduce it.

In 1929 we were confronted with a case of a badly comminuted fracture of the surgical neck which did not respond to the usual abduction treatment with traction. We then devised a method in which we used the Hawley table by bringing the traction bars, which are usually used to effect leg traction, to right angles to the table. In this way we obtained screw traction on the padded forearm in one direction and countertraction by means of a swathe around the body which is fastened to the opposite extension bar. The patient was given ether and when anesthesia was complete the screw traction was begun. We also placed a swathe around the upper end of the humerus close to the axilla. An assistant applied continuous traction. With these three forces the dislocation was reduced with comparative ease, following which the usual treatment for fracture was instituted.

Now let us see what the other school taught, that is, allowing the fragments to unite in the position of dislocation and attempt closed reduction or do an open reduction. The adhesions and scar tissue are usually so firm that the procedure results in either failure to reduce the dislocation or refracture the neck in attempting to do so, and frequently both.

In 1928 we had a case in which the patient, aged 75, had multiple fractures along with a fracture of the surgical neck of the humerus. A splint with traction was applied and three days later while checking the position of the fracture, a subglenoid dislocation of the head was noted. All methods were unsuccessful in effecting a reduction so it was thought best to let union take place, and then effect reduction. Four and one-half months later the fracture was healed and an open reduction done to reduce the dislocation. In this procedure we produced another fracture of the surgical neck and had to remove the entire head.

From this case we have learned that every effort should be made to reduce the dislocation within the first ten days and then treat the fracture. If it is not accomplished, open reduction is indicated and the head should be replaced. Removal of the head should not be done because the functional results are bad due to destruction of the muscle attachments.

Fracture of the Anatomical Neck

These fractures associated with dislocation were present in twenty-eight of the 122 cases in Lyman's series, seventy-three of which were in the surgical neck. They are more difficult to reduce and the same procedure should be followed as with surgical neck fractures. If not accomplished by closed reduction, operation should be done.

Rechtman, of San Francisco, urges replacement of the head rather than excision even though the humeral head is entirely detached from the soft tissues and therefore from its blood supply. Most other authorities, including Dr. Kellogg Speed, with whom I discussed this subject this past Saturday, says that all heads in this type of injury should be removed and the proximal end of the humerus placed in the glenoid fossa. Early active motion should be instituted and a good functional result is usually obtained.

In old people sometimes it is better judgment to allow the dislocated head to remain in its position providing there is no pressure on the axillary nerves or vessels. In this case early passive motion should be instituted to prevent muscular atrophy and bony union to the lesser tuberosity.

Separation of the Epiphysis

The accurate reduction of epiphyseal separation accompanying dislocation is most important because most of the growth of the humerus takes place at the upper end. This occurs only in patients under twenty years of age, at which time the epiphysis has usually united with the shaft. Closed reduction should be tried first according to the outlined method and, if not accomplished, open reduction should be done, and the head always replaced. Early motion should be instituted.

Conclusions

In this paper I have emphasized the importance of the early recognition and treatment of dislocation of the shoulder complicated by fracture of the upper end of the humerus and urge that the dislocation be treated promptly and conservatively by means of abduction traction and countertraction by the use of a Hawley table. If unable to reduce after one week, open operation must be done. In surgical neck fractures the head should be replaced in the glenoid cavity and in anatomical neck fractures, the head should be removed.

THE TREATMENT OF FRACTURES OF THE LOWER END OF THE HUMERUS

Orwood J. Campbell, M.D., Ph.D., F.A.C.S.

Fractures of the lower end of the humerus are of particular importance because of their influence on the future function of the elbow joint. In the interest of a good functional result, perfect anatomic reduction is of the greatest importance. Recent literature indicates a growing appreciation of this fact and open reduction is being more and more frequently resorted to when the best effort with the closed method leaves the fragments imperfectly approximated.

There are considerable differences in the mechanism, types and prognosis of these fractures in children as compared to adults.

The treatment, however, is much the same for both children and adults, and, despite the desirability of considering each separately, they are here considered together because of limited time.

Supracondylar Fractures, Dicondylar Fractures, and Separation of the Epiphysis as a Whole

Supracondylar fractures are the most frequently encountered of all fractures of the distal end of the humerus. Two varieties are described: the extension type, in which the plane of the fracture line runs obliquely backward and upward; and the flexion type, in which the obliquity is backward and downward. The former type greatly predominates and is accompanied by a characteristic backward displacement of the distal fragment, with prominence of the elbow and apparent shortening of the forearm. In children, the obliquity is less marked but the displacement is the same. There may be variable degrees of medial or lateral displacement associated with either variety.

Dicondylar fractures are intracapsular, traverse the lecranon fossa, and occur only after fusion of the piphyses. Separation of the epiphysis as a whole sually occurs only in the very young before the development of separate ossification centers. They are included here since the treatment is the same as that used for supracondylar fractures.

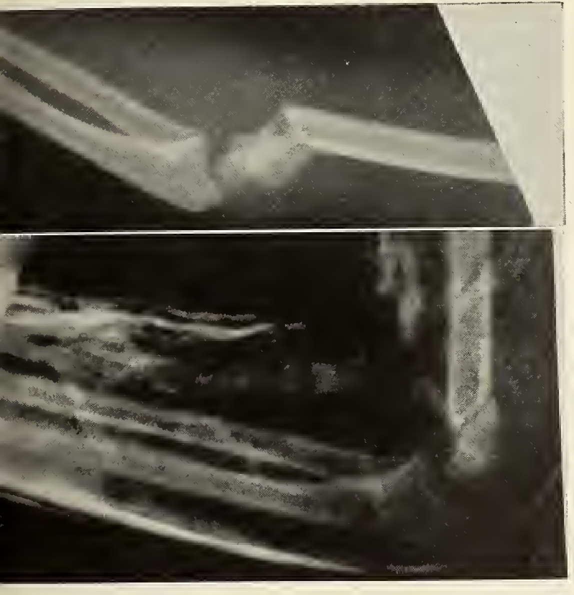


Fig. 1. Extension type of supracondylar fracture without wide displacement. This illustrates the usual mechanism of production and shows the position which must be secured by traction and hyperextension before reduction by flexion. The reduction is maintained by only moderate flexion.

Flexion of the elbow has been so frequently mentioned that a discussion of the treatment may well be prefaced by the admonition that the act of flexing the elbow does not accomplish reduction but is used solely in order to maintain a reduction already secured.

Such fractures are to be considered as surgical emergencies and, when treated promptly, limit the swelling and give a higher percentage of satisfactory primary reductions than when treatment is delayed. Except in the most extreme degrees, the best treatment for the swelling is reduction.

Reduction of the fracture should always be done under anesthesia (local for adults, general for children), and may be accomplished by the following maneuvers:

1. Traction on the forearm or condyles with the entire extremity in external rotation.
2. Slight hyperextension.
3. Manipulation of the distal fragment into position.
4. Correction of any medial or lateral displacement.
5. Flexion of the forearm on the arm.

Satisfactory reduction aims to preserve the proper forward tilting of the axis of the articular surface with respect to the axis of the shaft and the avoidance of the "gun stock" deformity or loss of the carrying angle which results when medial displacement of the distal fragment is not corrected or when medial rotation of the distal fragment is allowed to occur. Cotton and others have called attention to the fact that the shaft of the humerus is maintained in moderate external rotation, and that the reduction should be accomplished in this position, if some relative internal rotation of the distal fragment is to be avoided. It seems to be impossible to over-correct by external rotation.

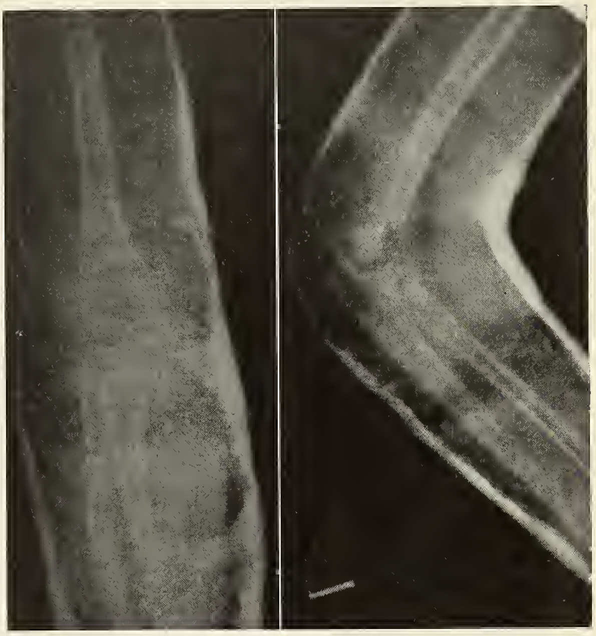


Fig. 2. Roentgenogram of a supracondylar fracture in which medial rotation of the fragment has occurred. The sharp edge of the lower end of the humerus is not the anterior but the medial margin of the shaft. Such displacement may occur after satisfactory reduction when the flexed extremity is swung across the chest in the Jones position.

Traction therefore should be made with the extremity in external rotation until overriding has been overcome. A slight degree of hyperextension will enable the distal fragment to be slipped into place and lateral or medial displacement corrected. The position may then be maintained by flexing the forearm, in which position the insertion of the triceps tendon is anterior to the axis of the humerus and the fragment is held snugly in place. Backward displacement is prevented by the tense expanded portion of the triceps tendon.

The degree of flexion required to hold the distal fragment in place is purely a matter of judgment, and is limited by the amount of swelling about the elbow. Most fractures are held by a moderate amount of hyperflexion. Extreme hyperflexion is rarely required. A safe rule is that of Key and Conwell, to flex until the radial pulse is lost and then extend past the point where it returns. The patient should then be kept under close observation for twenty-four hours.

The above described method of reduction is essentially that of Jones, who, after reduction in external rotation, then maintained flexion by fastening forearm to arm with adhesive tape or bandage and swung the extremity across the front of the chest with the padded wrist suspended just below the neck.

Unquestionably, this method suffices in most cases, but Eliason has shown that the act of swinging the arm and forearm across the chest brings about a change in the relation of arm and forearm and may result in slipping and internal rotation of the distal fragment.

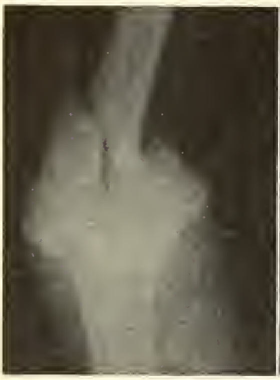


Fig. 3 *(left)*. Comminuted T fracture. Such a fracture may be treated either by open reduction by nailing of the fragments or by traction with a Kirschner wire through the olecranon.

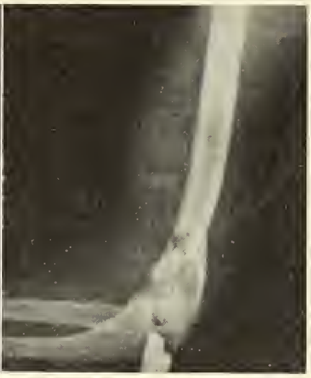


Fig. 4 *(right)*. Lateral view of the fracture shown in Figure 3. A Kirschner wire has been inserted in the olecranon and satisfactory position secured. A good functional result was obtained in this case with limitation of motion only at the extremes of flexion and extension.

This danger may be lessened by applying a posterior moulded plaster splint to the arm and forearm. After the splint has hardened, the extremity may be swung across the chest and supported by a bandage or swathe.

Fractures showing a tendency to slip and high supracondylar fractures are better immobilized with the flexed forearm maintained in external rotation. This is accomplished in a simple manner by including the forearm and chest in plaster bandages.

In the flexion type of supracondylar fractures there is a temptation to maintain the forearm in full extension. Such a position is undesirable from the standpoint of recovery of useful motion. Anterior and posterior moulded splints applied to the extremity with ninety degrees of flexion at the elbow will usually maintain correct position.

The period of immobilization is again a question of judgment. Early active motion within the range of slight pain and early light massage are highly desirable. This may be safely accomplished in some cases as early as the tenth day and in others may have to be delayed for three weeks. Rarely should active motion be delayed longer than three weeks in the adult. At the end of four to six weeks the posterior splint may be removed and the forearm supported in a sling.

Often active motion must be started and maintained even though some loss of position is suffered. A perfect anatomic result is a hollow achievement if it is accompanied by a stiff elbow. Passive motion should be used with caution and preferably in the later stages of healing. Too early and too enthusiastic passive motion may produce exuberant callus with bone block and restriction of motion. In children, passive motion must be delayed four to six weeks because of the danger of producing myositis ossificans.

T-Fractures and Comminuted Fractures

T-fractures and comminuted fractures may be treated by open reduction and fixation in those cases in which the fragments are large enough to be fitted and held in place. The rustless steel nail with the head left close beneath the skin for early removal is probably the best method of fixation.

Badly comminuted fractures are best treated by continuous traction with a Kirschner wire inserted through the olecranon. In this way early active motion can be started while traction is maintained. For the inexperienced surgeon this method may also be used in place of open reduction. A crude operation about the elbow joint will be disastrous to future joint function because of the overproduction of callus.

Condylar Fractures

Condylar fractures are next in frequency to the supracondylar variety and in children occur almost as frequently. The external condyle is most often affected. In very young children the separation follows the cleavage line of the external condyle and enters the joint to include capitellum and the external edge of the trochlea. In older children the line within the joint is the same but the outer margin of the shaft usually comes away with the external epiphysis.

The displacement is usually limited but there may be wide separation and there is a strong tendency to rotation downward, outward, and forward. This displacement affects the joint surface and in children may result in non-union, growth disturbance, and consequent valgus deformity.

Any reduction which is not perfect, jeopardizes union or results in excess callus and limitation of motion. Reduction by closed methods may occasionally be effective, but open reduction with fixation by suture or nailing will be found necessary in most cases and is recommended by Speed and Macy and others who have analyzed their results in cases in which both open and closed methods have been used.

Internal Epicondyle

Fractures of the internal epicondyle are rare. They are best treated by flexion of the elbow and manipulation. Union is often fibrous but the disability is not great. Some permanent weakness in the extensor group may result. For persistence of pain in an ununited fracture the fragment may be removed. In certain individuals, when strength in the extensor groups is important, widely separated fragments which do not approximate well should be sutured or nailed into place.

Volkmann's Ischemic Paralysis

A discussion of the treatment of fractures about the bow would be incomplete without mention of Volkann's ischemic paralysis, that most dreaded of all complications. Formerly attributed to tight splints or bandages, Volkmann's palsy is now known to occur most frequently as the result of subfascial hemorrhage into the flexor muscles of the forearm. The resultant swelling cuts off the circulation and causes death of muscle fibers and replacement with connective tissue. Scherb aptly points out that, were circular constriction the common cause, the extensors as well as the flexors would be involved.

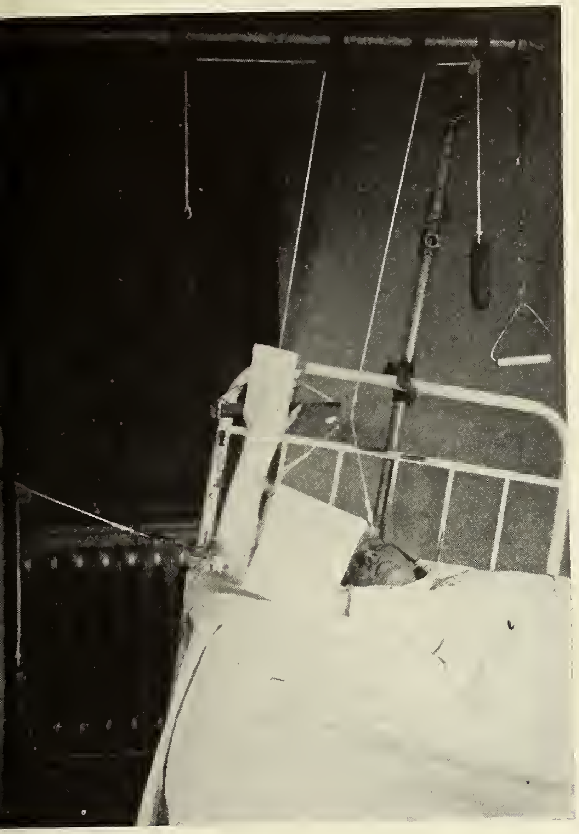


Fig. 5. Kirschner wire traction through the olecranon. The sling is optional and is here used to support a fracture of the middle of the shaft of the humerus.

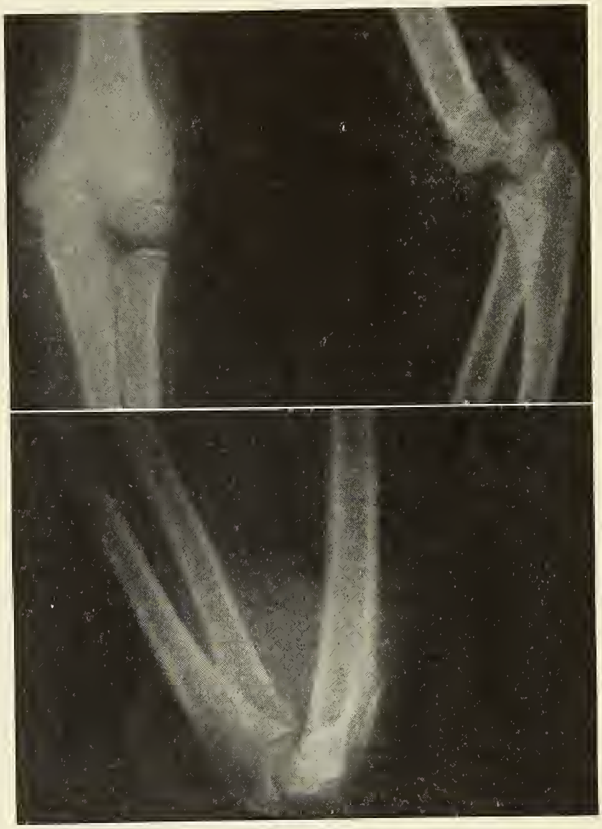


Fig. 6. Fracture of the lateral condyle of the humerus. The reduction is not perfect. This illustrates about the maximum displacement which may be accepted without open operation.

The early signs of such an impending disaster are most commonly:

a. Pain radiating into the fingers and made worse by passively extending the fingers.

b. Pallor or cyanosis of the fingers.

c. Reduction in volume, or loss, of the radial pulse.

d. Increasing pain after reduction of the fracture.

Irreparable damage may occur early, so that in cases showing the above evidences of circulatory disturbance, prompt action must be taken. A longitudinal incision on the medial aspect of the elbow and forearm with incision of the fascia and drainage of the muscle planes will prevent further damage and does no harm beyond producing a scar. Do not depend on the removal of the paster. Subfascial hemorrhage caused the trouble and will usually require operation.

Conclusions

1. The ordinary standards for satisfactory anatomic reduction of fractures are inadequate when dealing with fractures of the distal end of the humerus.

2. Perfect anatomic reposition of fragments should be the objective.

3. In certain types, such as condylar fractures, accurate reduction is important enough to warrant open reduction and fixation of fragments.

4. Complications should be watched for and immediately and effectively treated.

FRACTURE DISABILITY ESTIMATION

Harvey Nelson, M.D.

Time does not permit a very detailed discussion of a subject which requires such treatment to be of much practical value. I shall endeavor to explain as simply as possible what some of the fundamental compensation laws are that govern our estimation of disability, to outline a simple procedure for arriving at fairly constant percentages of disability, and, finally, to indicate what some of the basic values of function are in various joints or integrals of extremities.

It is surprising that the profession as a whole has so little conception of definite values of disabilities in fractures. It repeatedly occurs that one physician, for example, will make an estimate of disability of 75 per cent and another of 10 or 15 per cent. A certain amount of variance is, of course, justifiable as a matter of opinion or as a matter of mathematical error. However, examination made with any reasonable understanding should not vary more than 10 per cent except in exceptional or complicated cases. The ability to estimate permanent disabilities serves the further purpose of mathematically evaluating the end-result that has been obtained and brings to an interesting and concrete conclusion the end-result of any particular fracture.

I would like to express a word of caution—that, after all, it is the permanent disability we are estimating and the permanent disability, therefore, should not be estimated until it is reasonably certain that a permanent state has been reached. One common cause for error is too early a final examination or an early attempt to anticipate what an eventual permanent disability will be.

1. The Compensation Law

I am compelled to confine this discussion to the scope of the Minnesota Compensation Laws for the reason that I would like to make this simple and understandable and because I am not conversant with the laws of our adjacent states. The fundamental principles, however, are constant and the same ratio of values should hold in any state.

There are certain types of fractures which can be broadly excluded in this discussion for the reason that the law does not designate any specific value to that particular member of the body. I have in mind skull fractures and compression fractures of the spine. There is no specific value placed on the head, the neck or the back. Such fractures either result in complete recovery or fall into the general classification of permanent partial or permanent total disability. In these cases it is always a question of whether a workman can or cannot work without any necessity for an estimation of percentage loss of function. These cases, therefore, do not come under the purpose of this paper.

Probably many of you are entirely familiar with the basic values of extremities established by the Minnesota Compensation Law. For the benefit of those of you who do not have this information, and for the purpose of simplifying our discussion, I have tabulated these figures in a chart. The law has established the value of all or a part of an extremity in terms of weeks of compensation payments rather than in dollars and cents. To make myself clear, a workman is entitled to a healing period up to twenty-five weeks for convalescence, in which the individual is actually laid off from work. The permanent disability is paid in addition to this. For example, if a man lost an index finger and were laid off from work four weeks, he would receive four weeks compensation as his healing period and then would continue to receive compensation for another thirty-five weeks, thirty-five weeks being the specified value of the index finger.

The established values of all or parts of the extremities are therefore classified by law as follows:

Upper Extremity

Arm	200 weeks
Hand and wrist	175 weeks
Hand	150 weeks
Thumb	60 weeks
Index finger	35 weeks
Middle finger	30 weeks
Ring finger	20 weeks
Small finger	15 weeks

Lower Extremity

Leg	200 weeks
Foot and ankle	150 weeks
Foot	125 weeks
Great toe	60 weeks
Other toes	each 10 weeks

In estimating disability, therefore, we have to specify the smallest unit that is involved in that particular fracture. If the index finger again is the one involved, the disability estimate should be made on that finger and not for example on the arm or hand. It should also be remembered that estimates under the Minnesota Law are made with regard to general usefulness without any relationship to any particular occupation that any one individual may have been engaged in.

2. The Method of Procedure

In order to arrive at a uniform method of estimating disability, the procedure should be simple in order to be practical. I believe we are safe in saying that fractures cause permanent disability, primarily, by loss of, or instability of joint function; secondly, by malposition which in turn expresses itself in terms of mechanically wrong or painful joint function; and thirdly, by shortening. Weakness as a result of fractures, I believe, is ordinarily a symptom which merely indicates a more primary condition upon which our disability should be estimated. Muscle atrophy and weakness are, therefore, ordinarily included in the estimation of disability in terms of loss of joint function, as far as fractures are concerned. I am not going to attempt to describe the method of deriving a disability rating according to specific fractures, even of specific bones. The type of fracture, whether it is simple or comminuted, whether it is in good position or not, whether it does or does not involve a joint surface and whether it does or does not distort the joint contour, and whether there is union or not, are, of course, all factors of importance and contributing factors to the end-result. For all practical purposes, however, the main consideration reverts itself primarily to a determination of loss of joint function. The most obvious exception to this is shortening. For the average case a shortening of less than one inch in the lower extremities would scarcely be sufficient in itself to cause permanent disability. In my opinion, a shortening of one to two inches would cause 10 to 20 per cent loss of the leg. Shortening in most cases would play no material part in the upper extremities.

What equipment would be necessary, then, to accurately estimate disabilities? I believe that a tape measure, an ordinary carpenter's angle rule and possibly a grip machine, are all that are necessary for any case. We always make it a practice to accurately measure various levels of circumference in each arm or leg involved, in order to accurately record the effect a fracture might have in causing swelling or atrophy. Shortening should be measured and not guessed at.

Measurements of joint function are quite simply accomplished by merely measuring the angles of movement on the involved side with the angle rule, and comparing this range with the arc on the normal side. As a rule where a fracture is uncomplicated from any cause by loss of motor control, such as a nerve or muscle injury, it is better to measure the passive range of motion than the voluntary, as being a more accurate indication of the ultimate result. It is always advisable to measure the angles of range of all component motions in a joint area; for example, in the elbow, pronation and supination of the forearm should be considered as well as flexion and extension of the elbow joint proper. I, personally, make it a practice to compare the motions of all the joints on one side with the other as a means of determining the smallest unit involved. In evaluating the loss of motion that is present, it is necessary to allow for the fact that certain portions of the range of motion are more valuable than others; for example, the central two-thirds of the range of elbow motion is more valuable than the extremes of the range. The 90° of shoulder motion up to the horizontal is much more valuable than the 90° from the horizontal to the vertical.

3. An Evaluation of Joint Movements

The concluding portion of this paper is given with some hesitancy. It is somewhat of an assumption, to say the least, to put an arbitrary relative value on joint functions, although I believe the percentages given here come reasonably close to the generally agreed values. To avoid confusion, no attempt is made to differentiate the value of different parts of the arc of motion in any joint. The following evalutions are merely given for basic determinations of each joint's value, with the assumption being that the ankylosed joint is in good position.

Upper Extremities:

Shoulder movement	
Arm at side	75% of arm
From horizontal to vertical	25% of arm
Elbow movement	
Good position otherwise	60% of arm
Pronation and Supination	
Neutral position	25% of hand and wrist
Wrist movement	
Including the movements of dorsiflexion, palmar flexion, radial deviation and ulnar deviation	35% of hand and wrist
Fingers	
Proximal interphalangeal joint	60% of finger
Distal interphalangeal joint	40% of finger

In testing movement of the fingers the estimation of disability is sometimes facilitated by holding the metacarpal-phalangeal joint in a normal right angle flexion which transmits the limitation of motion to the interphalangeal joints, making the estimation a simpler procedure.

Lower Extremities

Hip joint movement	75% of leg
Knee joint	60% of leg
Ankle joint	35% of foot and ankle
Subastragloid joint	35% of foot
Great toe (interphalangeal joint)	25% of toe

In closing, I would like to mention several other factors which enter into our determinations. The first is instability of a joint, as in fractures of the tibial plateau where a downward depression of the condyle, together with a tearing of the lateral ligaments, causes an instability that may contribute toward a disability anywhere from 10 to 35 per cent loss of function of the leg. Another factor is the matter of pain such as in a fracture of the scaphoid bone of the wrist where a 10 per cent disability is frequently in order, and where an ultimate disability with loss of some motion as high as 20 to 25 per cent loss of function of the hand and wrist occasionally occurs. When a fracture occurs, pain may be a common factor in disability as in a fracture of the os calcis. If the fracture line here does not involve the subastragloid joint, frequently no permanent disability results, providing no deformity has occurred. Where this joint is involved a disability of 10 to 20 per cent of the foot, not including the ankle, usually occurs and this may run as high as 35 per cent.

These facts are submitted with the full knowledge that the figures quoted are subject to criticism and may be justifiably challenged. It is hoped that an attempt toward standardization of methods and basic facts will lead to more uniform opinions on a subject that should be largely mathematical. It is only by a cold mathematical conception of this subject that we all can hope to approach an impartial computation that would be of real value to all parties concerned.

Discussion

Dr. B. J. Branton (Willmar, Minn.) (by invitation): It has been a great pleasure for me to come to Minneapolis and attend this symposium. It has been my opportunity, during the last two or three months, to go over a number of questionnaires on malpractice sent out by the State Association and it has given me some rather accurate knowledge of just what is going on in the state in that regard. Following a symposium of this type, it should be interesting to you to know something about what is going on in regard to malpractice. It seems that following such a fracture meeting as this we should also have something along that line.

Checking over between 900 and 1,000 of these malpractice questionnaires, I found this interesting fact: out of that number approximately 65 per cent of the malpractice suits concerned fractures. Approximately 29 per cent of the men in our State Association have been harassed by malpractice suits or threatened malpractice suits brought against them which had been stopped before getting into court. It doesn't seem possible that twenty-nine out of every 100 men have been worried by malpractice suits and that 65 per cent had something to do with fractures. From these deductions I feel two things: First, that within the State Association we must keep closer to the old-fashioned type of ethics; and, second, from now on we must have more accurate knowledge of fractures such as can be gained here tonight from this wonderful symposium. As to the matter of ethics, it was interesting to me to see the good fellowship you had around the table, and following out that same trend is the fact that you have had a fine piece of postgraduate work, the speakers having given us accurate knowledge of many unusual things in a practical way.

I want to thank you for the opportunity of speaking here and again to tell you how glad I am that I came.

Dr. Henry W. Meyerding (Rochester, Minn.) (by invitation): I want to congratulate the Minneapolis Surgical Society upon the excellence of this program. The speakers have presented papers of practical interest to every physician. It would seem an excellent plan to place this vast amount of useful material in the form of a pamphlet for the general practitioners of the State.

It is impossible to discuss many of the points of interest which come to mind, so I will confine my remarks chiefly to the danger of Volkmann's ischemic contracture and to fractures of the hip treated by open operation.

The most common fracture associated with Volkmann's ischemic contracture is the supracondylar, which frequently occurs in children. When seen early and proper reduction is carried out, the Jones position of acute flexion gives excellent results. Should swelling be present before reduction, or reduction be imperfect, this position is dangerous because of the pressure exerted on vessels and nerves. Constant observation of circulation at the wrist must be maintained lest cyanosis and unbearable pain warn the physician or nurse of impending disaster. When the fracture cannot be maintained in good position without impairing circulation, it is best to leave it unreduced and to elevate the arm and then apply moist warm dressings for a few days. When a hematoma causes impaired circulation to a point of danger, early drainage and reduction are best. I have reported 128 cases of Volkmann's ischemic contracture and consider it one of the most disastrous complications of fracture, as it occurs so frequently in childhood, entails more or less permanent disability and often leads to malpractice suits. It is to be remembered, however, that Volkmann's ischemic contracture may occur when no treatment has been given.

The trend of orthopedic surgery for fractures of the neck of the femur appears to be toward internal fixation. The Whitman treatment of closed reduction and casts in the majority of cases has been and should be the treatment of choice among general practitioners. The convalescent period is long, the fixation irksome, and in the hands of many results are not as satisfactory as desired. In our desire to obtain accurate reduction, speedy union, and more certain results, we have utilized Johansen's method of open reduction, running a Kirschner wire through the trochanter, neck and head, and then driving a special Smith-Petersen nail, with a hole drilled longitudinally, along the wire. This permits accurate fixation, as the eye and roentgenogram check the position of the wire and nail. The wire is easily withdrawn, and the nail holds the parts firmly and accurately. Casts are worn, but the period of fixation in our cases has been reduced to a matter of weeks.

Gentlemen, I appreciate the invitation to attend your meeting and look forward to your next symposium

Dr. Robert Earl (St. Paul, Minn.) (by invitation): I greatly appreciate the privilege of being present at this instructive meeting.

I was especially interested in Dr. Zierold's paper on brain injury. In brain injuries, when both pupils are dilated and both fixed, we should give a grave prognosis. When one eye is dilated and one is not, it is assumed by many practitioners that this is an indication that the greatest brain injury has occurred on the side of the dilated pupil. It should be considered as a suggestive but not a positive sign.

The so-called "choked disk" does not occur until from twenty-four to forty-eight hours after injury, which is too late to be of diagnostic value as to the amount of intracranial pressure present in the early period.

Given a head injury in which the patient may have had a longer or shorter period of unconsciousness from concussion, followed by partial or complete return of consciousness, this followed by a second period of increasing stupor or unconsciousness with evidence of hemiplegia, we should think of a gradually increasing hematoma from hemorrhage. A hemorrhage may be so rapid as to endanger the patient's life in two or three hours or so slow as to require several days to form a hematoma large enough to jeopardize the patient's life from cerebral compression. These hemorrhages are often extradural from rupture of the middle meningeal artery and should be diagnosed and operated early as this offers the only chance of saving the patient's life.

In laceration of the brain, the unconsciousness and paralysis are present immediately after the injury, which hould help differentiate between laceration and hemor-hage. Brain lacerations cannot be helped by opera-on.

Dr. Arthur N. Collins (Duluth, Minn.) (by invita-on): It has been thoroughly worth my while to ome down from Duluth and listen to this program. One can always learn something in any symposium on ractures and this has been no exception. The hour is ate and I will not attempt any discussion at this time. Nothing has pleased me more, however, than to listen o these well presented papers. Let me thank the committee for my invitation to attend.

Dr. F. J. Savage (St. Paul, Minn.) (by invitation): was under the impression that the subject of fracture f the shaft of the humerus was to be presented. The eason I am presenting Figures 1 and 2 is that this plint, which provides efficient traction in such cases, s homemade and anyone can make one with a hammer, aw and nails, from a few strips of wood. Traction s provided by adhesive below the line of fracture nd the strips tacked over the lower right angled arm.

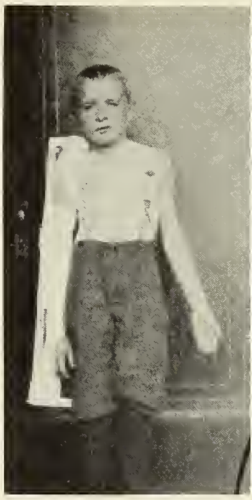


Fig. 1.

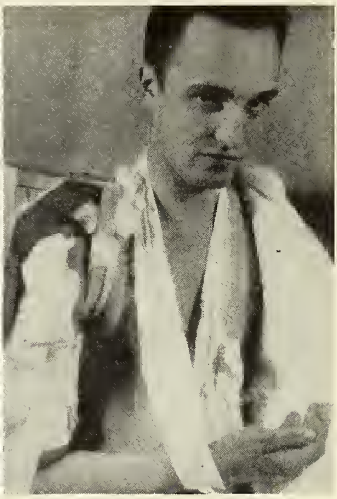


Fig. 2.

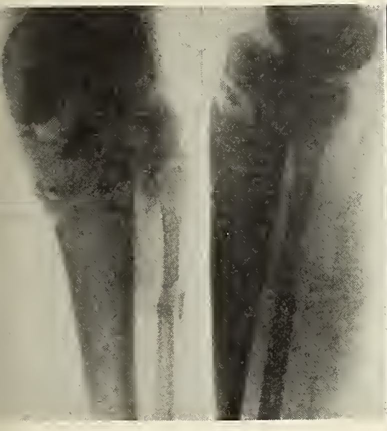


Fig. 3.

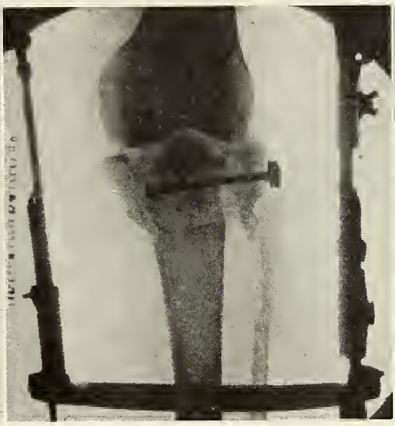


Fig. 4.

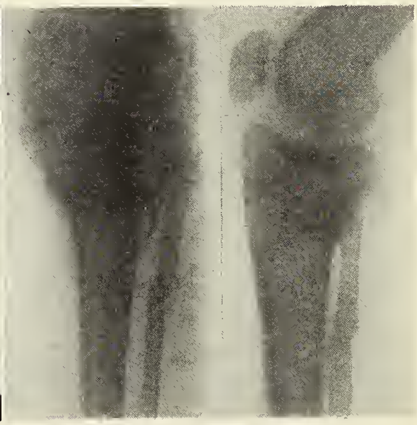


Fig. 5.

Counter traction is provided by a fitted piece of harness-maker's felt, covered with adhesive, and brought over the top of the upper arm and held in position by an additional band of webbing. This webbing may be sewed or pinned where it crosses the upper arm. Figure 1 shows a full length splint and Figure 2 a shorter splint with the elbow bent and the forearm n a sling. Care of the axilla by alcohol sponging and the use of talcum powder is essential.

With Figures 3, 4, and 5, I wish to substantiate Dr. Webb's presentation of complicated knee joint fractures. This man was forty-six years of age, and was using climbing irons on a power line pole. He fell sixteen feet to the frozen ground. The condition of his skin would not permit immediate operation. At the time he was first seen, some eight ounces of fluid were evacuated from the knee joint by knife puncture, the alignment of the shaft of the tibia corrected, and the leg suspended in a Thomas splint. Nine days later the knee joint was opened and the large fragment from the inner condyle brought into as good position as was possible. Through the same incision the condylar surfaces were elevated, and through small lateral incisions, a stove bolt was passed through a drill hole across the upper end of the tibia. The upper two inches of the tibia were so comminuted that the area gave the impression of a bag of crushed ice.

The leg was suspended in a Thomas splint with a hinge at the knee, and a Kirschner wire passed through the os calcis and five pounds of extension applied. The Kirschner wire rested across the lower end of the splint and prevented rotation.

Passive motion, light massage and application of heat were started on the second and third days. The bolt was removed in four and a half weeks. The man has extension to within five degrees of normal, flexion to over ninety degrees, but five degrees more lateral mobility than on the normal leg.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

BOOKS RECEIVED FOR REVIEW

A Textbook of Nursing Technique. Marion L. Vannier, R.N. Formerly Superintendent of Nurses, University Hospital, Minnesota, and Barbara A. Thompson, R.N., B.S., Director of Wisconsin Bureau of Nursing Education, etc. 265 pages. Illus. Price, $2.50 cloth. Minneapolis: University of Minnesota Press, 1935.

Bee Venom Therapy. Bodog F. Beck, M.D. 238 pages. Price, $5.00 cloth. New York: D. Appleton-Century Co., 1935.

Diabetes Mellitus and Obesity. Garfield G. Duncan, M.D., C.M. Associate in Medicine, Jefferson Medical College, Philadelphia, etc. 215 pages. Illus. Price, $2.75, cloth. Philadelphia: Lea & Febiger, 1935.

Diseases of the Mouth and Their Treatment. Herman Prinz, A.M., D.D.S., M.D., D.Sc., Professor Materia Medica and Therapeutics, Thomas W. Evans Museum and Dental Institute, University of Pennsylvania, and Sigmund S. Greenbaum, B.S., M.D., Associate Professor of Dermatology and Syphilology, Graduate School of Medicine, University of Pennsylvania. 601 pages. Illus. Price, cloth, $9.00. Philadelphia: Lea & Febiger, 1935.

How to Care for the Baby. Violet Kelway Libby. 110 pages. Price, cloth, $1.00. Washington, D. C.: The Plymouth Press, 1933.

Hughes' Practice of Medicine. Revised and edited by Burgess Gordon, M.D., et al. 808 pages. Illus. Price $5.00, flexible cover. Philadelphia: P. Blakiston's Son & Co., 1935.

Illustrative Electrocardiography. Joseph H. Bainton, M.D., Attending Physician and Chief of Cardiac Clinic, Morrisania City Hospital, New York, etc., and Julius Burstein, A.B., M.D., Associate Cardiographer Morrisania Hospital, etc. 258 pages. Illus. Price, cloth, $5.00. New York: D. Appleton-Century Co., 1935.

One Hundred and Fifty Years of Publishing, 1785-1935. 42 pages, cloth. Philadelphia: Lea & Febiger, 1935.

Stammering and Allied Disorders. C. S. Bluemel, M.A., M.D., F.A.C.P., M.R.C.S. 182 pages. Price, $2.00 cloth. New York: MacMillan Company, 1935.

The Crippled and the Disabled. Henry H. Kessler, M.D. 337 pages. Price, $4.00, cloth. New York: Columbia University Press, 1935.

The Patient and the Weather. Volume II. Autonomic Dysintegration. William F. Petersen, M.D., 530 pages. Illus. Price, cloth, $6.50. Ann Arbor, Mich., Edwards Brothers, 1934.

The Safe Period. William J. Robinson, M.D., Editor of the Medical Critic and Guide, etc. 16 pages. Price 10c, paper cover. New York: Eugenics Publishing Company, 1935.

Tuberculosis. Fred G. Holmes, M.D., Director of the National Tuberculosis Association, etc. 312 pages. Price, $2.00 cloth. New York: D. Appleton-Century Co., 1935.

DINITROPHENOL IN OBESITY

Since the clinical report on the use of alpha-dinitrophenol in obesity appeared in The Journal (July 15, 1933, p. 193), interest in this product and its actions has been widespread. Unimpeded by marketing restrictions, dinitrophenol has been sold and used indiscriminately with the inevitable serious toxic effects. Basically there are two paramount features to consider. There is no doubt that dinitrophenol can increase the tissue metabolism, probably by direct action on the cells and without producing the side actions that accompany metabolic stimulation by thyroid. The second important fact is that the margin between therapeutically tolerated doses and definitely toxic ones is often narrow. Tainter and his co-workers have considered the toxic effects from the standpoint of fatalities and from the reported lesions of the skin, liver, kidneys, circulation, blood and gastro-intestinal tract. In a group of 113 obese persons treated by dinitrophenol, skin rashes were observed in about 7 per cent. Since these skin rashes may be unpleasant or alarming in some instances, they constitute the main disadvantage, Tainter believes, in the therapeutic use of dinitrophenol. About half of the patients who have had one skin reaction are able, however, to resume the medication later without any further difficulty. With regard to liver damage it appears that ordinarily there is no demonstrable evidence of injury of this organ from the drug. Possible toxic effects on the kidney seem to be even more remote. In considering the circulatory system Tainter and his co-authors say that "the metabolism may be increased by as much as 50 per cent without demonstrable changes in circulatory activity. . . . Patients who have hypertension can be medicated with dinitrophenol like other patients." It is perhaps malignant neutropenia occurring during dinitrophenol medication that has aroused the greatest professional alarm. Although Tainter and his co-workers have seen no cases of agranulocytosis they feel that the possibility of agranulocytosis must be borne in mind pending further observations. Since dinitrophenol is a drug of potential dangers when used indiscriminately, its sale should be restricted to that ordered by the physician's prescription and its use by medical men should be carefully supervised. (Jour. A. M. A., Dec. 22, 1934, p. 1950.)

CLAIMS FOR ANAYODIN

A circular letter from Ernst Bischoff Company on Anayodin contains the following statement: "ANAYODIN comes nearest to being the ideal amebacide. It safely rids the intestinal tract of amebæ, usually with a single treatment of four pills three times a day for eight days." The statement is far too optimistic. There is no known amebacide that can be depended on to eradicate Endamœba histolytica from the intestinal tract with a single course lasting eight days. Such propaganda is exceedingly unfortunate. Anayodin is a proprietary name for chiniofon-N. N. R. The Council on Pharmacy and Chemistry has considered Anayodin and found it unacceptable for New and Nonofficial Remedies. The Council has accepted the following brands of chiniofon: Chiniofon-Searle and Chiniofon-Winthrop. (*Jour. A. M. A.*, January 12, 1935, p. 139.)

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society.

Volume 18 APRIL, 1935 Number 4

RETINAL DETACHMENT*

FRANK E. BURCH, M.D.

Saint Paul

NORMALLY the retina is firmly adherent to the underlying pigmented layer of the choroid only at the optic nerve, the macula, and at its anterior limits (the ora serrata) near the equator of the eyeball. Elsewhere the adhesion between the choroid and the retina is not very firm, the retina being more or less supported in its position by the vitreous gel. Detachment takes place as a separation between the rod and cone layer of the retina proper and the pigment epithelium attached to the underlying choroid, *i.e.*, serous fluid collecting in the embryonic space between the two layers.

Wardrop, in 1834, gave us our first description of this condition in the English language. He wrote, "I have had opportunity of dissecting several eyes where a serous fluid had collected between the choroid coat and the retina. In these cases, the retina and vitreous humor were displaced and compressed by a morbid collection of water; the vitreous humor being more or less absorbed, whilst the retina shriveled up, and formed a white bundle." The first description, in English, of surgical treatment for this condition was by MacKenzie, about 1850. He advised simple drainage of subretinal fluid by scleral puncture. In 1864, Bowman, describing a treatment for retinal detachment, stated: "My object has never been to give external vent to fluid, though this has almost always been one immediate effect of my punctures, but rather to open a permanent communication inwards from the subretinal space, under the idea of allowing the infused fluid to escape *into* the vitreous chamber rather than to spread further between the retina and the choroid." And so, on and on, during seventy years, with little idea of the exact etiology, the treatment of detachment of the retina was based on wrong principles, consisting largely of prolonged recumbency and elimination. It was exceedingly disappointing from every angle of surgical attack.

Although the ophthalmoscope has been in use for eighty years, and Coccius described retinal tears in 1853, soon after its invention, little or no attention was given to the fact that almost invariably, retinal detachment is associated with a tear or hole in the retinal tissue. Von Graefe considered holes in the retina as incidental to detachment. It was not until 1923, after Gonin of Lausanne stressed the fact that closure of the retinal tear or hole resulted in *cure* of retinal detachment that any successful results have followed treatment. No one paid much attention to his thesis (to be discussed later) until about 1929. My interest in this subject was first stimulated by a very highly respected member of this society—not an ophthalmologist—who, about in 1928, sent me a copy of a Schweizerische medizinsche Wochenshrift describing a new cure for retinal detachment.

Detachment of the retina is brought about in a variety of ways. When localized inflammatory processes develop in the choroid (the circulatory, nutritional tunic between the retina and the sclera) with secondary changes in the retina itself, there develop points of exudate in the vitreous. These form an attachment between the *vitreous* and the retina. In many affected eyes the vitreous is more or less fluid in character. Undoubtedly, traction of vitreous bands upon the retina, often with the aid of some slight trauma is the beginning of a retinal tear. Fluid separates from the vitreous gel, passes through the retinal tear or hole, burrows between the retina and the choroid, and separation results.

---

*Read before the Minnesota Academy of Medicine, St. Paul, November 24, 1934.

The mere existence of a hole or rent in the retina need not necessarily cause a detached retina. In removal of magnetic foreign bodies from the eye by the posterior route, we invariably incise the retina near its equator. If the vitreous is not diseased, healing occurs without retinal detachment or a temporary detachment may subside spontaneously.

Frequently, in so-called idiopathic detachment, gravity plays a part. Especially when the detachment is in the upper quadrant of the eye, separation of the retina from the choroid gradually extends downward until the main collection of subretinal fluid may be in the lower quadrant of the retina. Then the upper portion of the retina may remain as a fairly *flat* detachment. Detachment of the retina may become quite complete. In complete detachment, the retina may remain adherent only around the optic nerve and macula, and at the equator (ora serrata). The fact that retinal detachment is less common in the young excepting after rather severe trauma, is accepted as further proof that cystic and atrophic degenerations in the retina with advancing age is another contributing factor. In my series of thirty operated cases the average age was forty and one-half, the youngest being sixteen, the oldest seventy-three. The right eye was involved in fourteen instances, the left eye in sixteen. There were fourteen males, and sixteen females. Myopia favors retinal detachment because of the axial elongation of the globe with consequent stretching of all the ocular tunics, together with the fact that in myopia the vitreous undergoes certain nutritive impairment and degenerative changes.

Trauma is a very decided factor. A history of trauma was obtained in about one-third (11) of my patients. The percentage is doubtless higher, for many minor concussions of the eye and head occur and are quickly forgotten. Detachment may be very insidious in development, slight in extent, and may not produce an impairment of vision to a degree that the patient's attention is called to it until it has existed for a considerable period. This is especially true when the detachment orginates in the lower part of the fundus. Thus one is rarely able to determine the exact time when detachment first exists. In my series most of the cases were of recent origin. Many cases have been refused operation for the reason that I believed the outlook too unpromising, the condition having existed for a very long time, being too extensive, or complicated by extreme myopia, cataract, or old age. Some patients refused to undergo operation. Vogt of Zurich, before the Swiss Ophthalmological Society, in May, 1934, reported a case cured after seven and three-quarter years. Vision improved from 1/200 to 5/30.

It was Gonin who was able to prove that retinal holes were present in practically 90 per cent of all idiopathic and traumatic cases, could be found if searched for, and, what was most important, that their closure was the first factor in successful treatment. A variety of holes or tears is found in association with detachment. Sometimes they are mere slits or rents in the tissue. At other times they are found as horseshoe or arrow-shaped holes. At other times there is a tearing away of the retina from its equatorial attachment at some location and we speak of it as disinsertion, or dialysis of the retina. This type most commonly follows trauma, and the tearing away of the retina is usually below or on the temporal side.

Detachment Without Holes.—It *is* possible to have retinal detachment without a hole or tear in the retina, and this is the case in the type of detachment we sometimes see with eclampsia and severe toxemias of pregnancy. Here the detachment is doubtless produced by vascular hypertension and toxemia with the formation of extensive choroidal exudates in the retina and between the retina and the underlying choroid. It is a local manifestation of the generalized edema associated with nephritis. In a series of twenty-one cases collected by Fry, 71 per cent were bilateral and in 85 per cent the retina reattached spontaneously, some within a few days.

I was able to follow a case of this type very closely in a patient admitted under Dr. Litzenberg's service at the University Hospital. A young woman, aged 28, was in the eighth month of her third pregnancy. Five weeks previously, her physician noted rising blood pressure, soon followed by albuminuria and edema of the extremities. Her vision became blurred one week previous and she was practically blind just before admission. A severe eclamptic convulsion occurred the night before her admission. Ophthalmoscopic examination revealed an almost complete detachment in each eye. Her blood pressure was 256/154; the urine: Sp. G. 1032, Alb. 34, many casts of all types, a few red and white blood cells; blood chemistry: CO_2 combining power, 37 per cent, N. P. N. 28.5, uric acid 3.07. She was promptly aborted. From the third to the sixth day after delivery under intensive treatment with urea by mouth, and restriction of fluids, the excretion of fluid practically trebled the fluid intake. Her edema subsided, the blood pressure within ten days returned to normal and there was no albuminuria. Six days after delivery, the detachments in the upper quadrants of the eye had disappeared. On the tenth day there was no evidence of detachment in either eye. The residual retinal hemorrhages and exudates had entirely resorbed within three months, and vision in each eye was 20/30 when the patient last reported.

Likewise one may rarely find detachment unaccompanied by tears or holes in retinal edema with advanced chronic nephritis *not* associated with pregnancy.

I was able to find holes or disinsertions in twenty-three out of thirty cases accepted for operation. Of these, sixteen were in the upper quadrant, only three were below the horizontal meridian, and four were disinsertions or a tearing away of the retina near the equator.

The importance of finding and localizing holes as the *first* principle in the underlying treatment is proven. We have learned that cures are directly proportionate to complete closure or walling off of communication between the vitreous and the subretinal space. Considerable difficulty is sometimes encountered in finding the rent or tear through which fluid separated from the vitreous finds its way into the subretinal space. Folds of overhanging retina which are often undulant and movable, may demand time-consuming, meticulous ophthalmoscopic examination, with the patient in different positions, before they may be discovered. At times complete occlusion of both eyes with the patient recumbent permits the detachment to flatten out; then only may the opening in the retina be seen. Rarely it is necessary to aspirate or drain away the subretinal fluid before they may be found. Again the hole may be found above, the main prominence of the detachment being below, from the effects of gravity, as previously mentioned.

Our present day basis for successful surgical treatment is premised on three fundamental principles: (1) localization and closure of a retinal tear or hole; (2) drainage of subretinal fluid; (3) induction of a mild choroiditis to secure adhesions between the retina and its pigmented layer. The means of accomplishing these has been an intriguing evolution in technic and has resulted in an increasing percentage of cures, with refinements in the methods employed.

Having found and localized the meridian and estimated the distance from the limbus of the communication between the vitreous and the subretinal space, we consider the means of its closure. Gonin sought to close these holes after exact localization by the introduction of a Pacquelin cautery through the sclera at the site of the hole to produce an adhesion around the edges of the retinal hole to the underlying choroid.

It was my privilege to hear his report upon his results in 100 cases before the International Congress of Ophthalmology, Amsterdam, in 1929. Without having ever seen the operation done, my first case was operated upon by Gonin's method in December, 1931, using the fine electric, instead of the Pacquelin cautery. It was entirely successful. Five patients were subjected to this procedure. In two others a temporary cure was produced. With Gonin's method, few ophthalmic surgeons could duplicate his results. In the first place, it traumatized the retina considerably. It damaged the vitreous. It seems logical to conclude that further adhesive bands in the vitreous must form after this procedure. It is not applicable as a one-operation procedure where more than one hole existed, as is frequently the case. It is often difficult to exactly localize the hole, topographically, upon the sclera, because the retina is separated from the sclera by several millimeters of subretinal fluid. This was the difficult thing about Gonin's single cauterization method.

After Gonin's writings upon this subject, almost immediately the Vienna school of ophthalmologists, partly in view of the fact that the hole or rent could not always be found and exactly localized, and partly to lessen the trauma to the delicate retinal tissue and the vitreous, devised a substitute procedure. This so-called Guist-Lindner operation consisted of laying down a barrage of trephine openings in the sclera, without penetrating the choroid or the retina, around the hole or tear when found. When no hole could be found, an extensive barrage of trephine openings was made through the sclera down to the choroid, over the most prominent part of the detachment well behind the equator. Chemical cauterization of each of these 1.5 to 2 mm. trephine openings with potassium hydroxid, quickly neutralized with dilute acetic acid, was done to induce an adhesive process between the choroid and the retina, finally perforating the choroid to allow escape of the subretinal fluid. This method was entirely successful in inducing choroiditis around the hole or where it was presumed to be. After the escape of the subretinal fluid through the special opening, the retina, coming in apposition with the choroid, became adherent to it. Fluid then could no longer traverse the opening and secure access to the so-called subretinal space, lifting the retina from its base.

The Guist-Lindner method proved to be a very laborious procedure. Sometimes the trephine perforated the choroid, the subretinal fluid escaped, and the operation had to be abandoned because of the difficulty of trephining the sclera after the intraocular tension was thus lowered. The method never appealed to me after seeing it done. Therefore, in my second series of cases (seven in number) employing the cautery at dull red heat, I sought to induce an adhesive choroiditis with a barrage of cauterizations just going down through the sclera, also without perforating the choroid until after completion of the barrage. Then I punctured the choroid to permit drainage of the subretinal fluid to allow the retina to drop back against the choroidal coat. In this series of seven cases, four were entirely successful, one was improved, and two were not improved. No unfortunate sequelæ followed with any of these patients.

In 1930, Sven Larsson of Stockholm and Weve of Utrecht studied the possibility of diathermy as a means of adequately controlling the induced exudative choroiditis without risk of damage to the retina itself, or to the vitreous. Larsson's method was a type of surface diathermy applying a small ⅔ mm. ball electrode against the dried sclerotic over the detached detached retina in several places, employing a 50 M. A. current for five seconds. This was followed by drainage of the subretinal fluid through a trephine opening. One of Larsson's objectives was to be able to ignore the hole or tear, at the same time minimizing the danger of hemorrhage. He secured approximately 50 per cent of cures. Weve employed the surface electrode, and also made multiple micropunctures with fine needles encircling the entire vicinity of holes or tears which were carefully localized, finally cauterizing a larger opening to drain the subretinal fluid. [Drainage of the subretinal fluid constitutes an important principle in the success of surgery for retinal detachment. It must be adequate to permit contact between the retina and the choroid.] Finally, Weve abandoned surface diathermy resorting to needles only, the time of current application being judged by the eschar effect on the scleral surface, usually only a few seconds.

Finally, in order to overcome the objections to the Gonin, the Guist-Lindner, and the Larsson-Weve technic, Safar of Vienna devised a type of needle 1.5 mm. long for penetrating the sclera and fulgurating the choroid while the subretinal fluid was retained, thus preventing contact with the retina. A high frequency current of 30 to 50 milliamperage is used for only a second, permitting a fairly uniform *induced* choroiditis. The micropunctures are distributed in a manner to seclude a hole or tear in, or disinsertion of, the retina. The advantage of a barrage of micropunctures, using very short needles around the opening, induces practically no trauma to the two very important structures involved, namely, the retina and the vitreous. Frequently, 20, 30, even 40 micropunctures are made, dividing a muscle freely when necessary, and later reattaching it, in order to cover the necessary field. In the case of a disinsertion, I have on occasions laid down a barrage of micropunctures over an arc covering half of the globe, *i.e.*, from the equator at one point to a position on the equator on the opposite side. After this barrage, a single free opening is made as nearly as possible over the site of the tear to permit adequate escape of the subretinal fluid, and this is done after the tiny needles, each of which has a thread attached to it, are withdrawn. Special iridoplatinum needles and a more delicate special high frequency apparatus were designed by Dr. Clifford Walker of Los Angeles, and these are now quite standardly used in this country. The needles are placed at points in the sclera about 2 to 3 mm. apart, endeavoring to encircle the retinal hole or holes or disinsertion. Because of their shortness and their method of application with the aid of silk thread, it is found that holes can be encircled much farther back toward the posterior pole of the globe than with the needles designed by Safar.

The Walker diathermy needles, such as I have used almost exclusively, do not produce any visible scleral necrosis. Animal eyes examined after diathermy show no appreciable damage to the sclera. Ordinarily the retina is untouched, because it is separated from the choroid by subretinal fluid until the fluid is drained.

The choroid is fulgurated for a zone of 1 to 2 mm. around the point of the needle, depending upon the milliamperage employed. The usual inflammatory reaction occurs with exudation through the pigment layer, resulting in chorioretinal adhesion over the soft scars in the choroid. The retinal degeneration which occurs is largely confined to the adjacent rod and cone layers; the increase in the visual fields is the best evidence of restored function. The all-important macular area is usually successfully reclaimed, when involved.

Seventeen patients have been operated upon by the Safar-Walker method, twelve of these are perfect results today; two are too recent to include, but apparently reattachment of the retina is safe; two were total detachments of the retina and the operation was a failure; in these two no holes could be found. In one other case in which no hole was found, the result is an improvement but it is not a complete reattachment.

Again emphasizing certain surgical principles in the operation for detachment of the retina: (1) the presence and as nearly as possible the exact localization of a hole, or holes or tears; (2) the induction of an adhesive choroiditis of mild degree *around* these openings with a minimum of trauma; (3) the release of subretinal fluid sufficient to procure ample drainage and permit recontact of the retina and the choroid; (4) a perfect local anesthesia. For this one must use a retrobulbar novocaine injection.

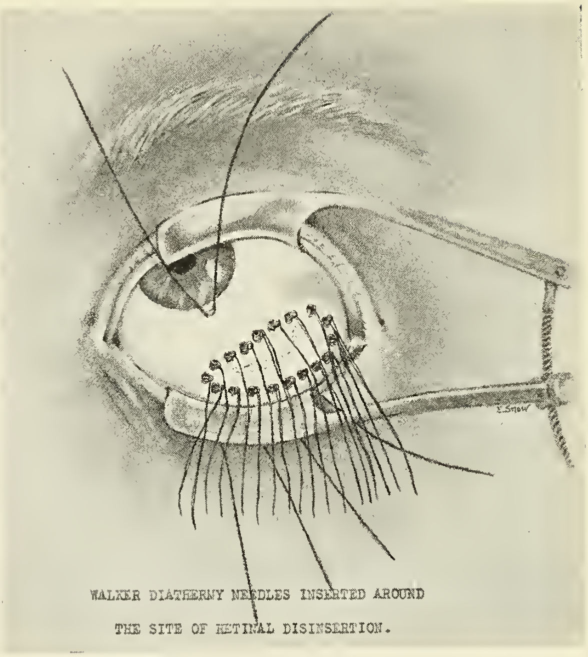

WALKER DIATHERMY NEEDLES INSERTED AROUND THE SITE OF RETINAL DISINSERTION.

Fig. 1.

The causes of failure are chiefly too old or too extensive a detachment, non-coöperative patients, hemorrhage, failure of the reattached retina to adhere, cataract, or aphakia following cataract, iridocyclitis, nystagmus, very old persons who cannot be kept quiet over long periods, various other degenerative changes in the eye. Three of our patients were very uncoöperative. The result was perfect in one of these in spite of himself; the other two were failures. Usually three weeks is a minimum of absolute quiet in bed in a position most favorable for reattachment of the retina. Finally, complete occlusion of both eyes during this period, thorough cycloplegia in the operated eye for a prolonged period with the use of peephole spectacles to limit ocular excursions for a still longer period during convalescence. Finally, a very quiet life over a period of many weeks after discharge with precautions to avoid recurrence. Our oldest case is now a three year cure. There have been only three redetachments where firm reattachment had been secured, one following severe coughing, another after a fall, one unexplained. Since employment of diathermy in our last seventeen cases, thirteen patients left the hospital with good reattachments. One later had a fresh detachment not involving the original area. Three are still in bed, and two of these are, thus far, good. promising prospects for permanent cure. The total of twenty-nine cases gives seventeen successes (59 per cent) remaining attached to date.

GASTRITIS, A PHENOMENON OF PYLORIC OBSTRUCTION AND ITS RELATION TO DUODENAL ULCER*

WALTMAN WALTERS, M.D., and GERALD T. CHURCH, M.D.

Rochester, Minnesota

A STUDY of the medical literature of the last decade, referring to studies on duodenal and gastric ulcer, resolves itself into a discussion of sub-total gastrectomy versus gastro-enterostomy, or pyloroplasty,[3,4,5,10] and of the relation of gastritis to duodenal and gastric ulcer.[2,7,8,9,18,19,20] For the sake of comprehension it is best to review the events which led up to the decision by certain European surgeons, particularly those of Germany and Austria, to advise and carry out subtotal gastric resection in the treatment of duodenal ulcer. Subsequent to the war, it was the experience of German surgeons that gastrojejunal ulcer was occurring in a much greater percentage of cases than had been apparent previously.[3] They found the incidence to vary in different German clinics from 10 to 30 per cent following gastro-enterostomy.[5,10,14,17] By substituting subtotal gastrectomy for gastro-enterostomy, certain of the German and Austrian surgeons found that they were able to reduce the incidence of recurring ulcer to approximately 1 to 2 per cent.[5,10,14] After employing subtotal gastrectomy in a large series of cases Finsterer, of Vienna, presented his material before various medical societies in the United States, in 1922, advocating use of the operation as a routine in the treatment of duodenal ulcer. About this time reports were appearing in the literature from other German surgical clinics, noteworthy among which was a report from Kiel by Anschutz and Konjetzny, and by Puhl,[8,15] of the constant finding of various degrees of gastritis in all specimens of stomachs removed during the course of subtotal gastrectomy for duodenal ulcer. Konjetzny's[7] monograph on this subject is an outstanding contribution to the medical literature on gastritis.

The finding by these observers, and by others in Germany, of associated marked inflammatory changes in the walls of the stomach, associated with duodenal ulcer, led to the conclusion that gastritis preceded the development of duodenal ulcer, and it was but a step beyond this for them to reason that it was one of the etiologic factors in the development of duodenal ulcer. However, the etiology of gastritis continued to remain a speculative problem. Accepting the work of the German surgeons as being applicable to patients of other nationalities, Berg and Lewisohn, finding a larger percentage of gastrojejunal ulcers among their patients subsequent to gastro-enterostomy than had been reported from other surgical clinics in the United States, began performing subtotal gastrectomy in the treatment of duodenal ulcer. On various occasions during the past ten years they have reported that, by using this procedure, they have reduced the incidence of gastrojejunal ulcer among their patients from a proved 16 per cent, which it had been previously following gastro-enterostomy, to approximately 1.5 per cent.[4,10] Although such procedure was advocated by them and by some few other American surgeons, significant pathologic studies of the specimens removed were not reported until lately[2] and hence, in order to obtain information for comparison of the groups of cases on the basis of the pathologic nature of these lesions as compared with those encountered by German surgeons operating in Germany, Snell and one of us (Walters) made a study of this problem, in 1931, the results of which have been the foundation of several publications.[18,19,20] To summarize our studies, we found gastritis associated with duodenal ulcer to be an almost constant finding in the specimens removed at operation in various German surgical clinics during the time when we visited them in 1931. The same was true of an unselected group of specimens previously removed by Schmieden at Frankfort, by whose courtesy we were able to make pathologic studies.

As it was our impression that gastritis was absent in most cases of duodenal ulcer in which operation was performed at The Mayo Clinic, careful, detailed, pathologic studies were made of specimens of stomach removed in the course of gastric resection at the clinic to determine the incidence and degree of gastritis associated with duodenal ulcer. In few of the specimens we examined was there gross evidence of gastritis, and when it was present it had been so reported.[18] However, in view of the fact that the question arose in a recent paper by Aschner and Grossman regarding the presence of gastritis, which had not been apparent grossly in some of their cases, but had been found on microscopic examination, we, assisted by Dr. Wellbrock, examined microscopic sections of tissue removed from various parts of the stomach in a group of cases of duodenal ulcer in which gastric and duodenal resection had been performed.

---

*From the Division of Surgery, The Mayo Clinic, Rochester, Minnesota. Thesis presented before the Minnesota Academy of Medicine, St. Paul, October 10, 1934.

The series studied consisted of twenty-seven cases in which, during the course of removal of certain duodenal ulcers, it seemed advisable to perform partial gastrectomy. These were cases of recurrent ulceration, of duodenal ulcer complicated by repeated and serious hemorrhages, and of high gastric acidity in which the duodenal lesion was such that the procedure could be carried out without undue risk to the patient. The group of cases is small, but it was felt that certain determinations as regards pathologic changes and clinical progress should be made in comparison with cases in which gastro-enterostomy or pyloroplasty had been performed. The specimens were reëxamined grossly. In three of the twenty-seven cases, gross evidence of inflammatory change was present; in two of these specimens, diffuse hemorrhagic gastritis was present, with zones of ulceration in the gastric mucosa and, in the third, changes were even more marked and consisted of inflammatory changes and large serpiginous ulcerations. The other twenty-four specimens exhibited what appeared to be normal gastric mucosa.

The resected portions of stomach that were studied were opened along the greater curvature. As the most marked gastritis has been reported to occur along the lesser curvature, sections were cut approximately 3 cm. from the pyloric and cardiac ends of the specimen, on the lesser curvature, and from any intermediate region that appeared to be suggestive of inflammatory change. Care was taken not to section too near primary ulcerations and to avoid the line of resection near the cardia, in which trauma from the application of clamps could be a factor in mucosal change. Microscopic examination revealed normal structure in twenty-one of the twenty-four specimens which grossly had appeared to be normal. In these twenty-one specimens the mucous lining, crypts, and glands were normal. Microscopic erosion was not present; the interstitial tissue revealed no increased lymphatic hyperplasia and there was no infiltration of polymorphonuclear leukocytes. The other three specimens exhibited a mild inflammatory reaction, graded 1, in all of the sections cut and studied. Mucus, evidence of inflammation, was present on the tips of the villi. Lymphatic hyperplasia, slight edema, and mild lymphatic and polymorphonuclear leukocytic infiltration in interstitial tissues also were present.

It is of interest that six cases of recurring ulceration were studied in the entire series. In five of these gastro-enterostomy had been followed by resection of the gastro-enteric stoma for gastrojejunal ulcer; in the other case, pyloroplasty had been performed before resection. Duodenal ulceration had recurred and the ulcerated portion was removed, together with portions of the duodenum and stomach. In any group of cases of recurrent ulcer a high incidence of gastritis might be expected, yet, in this group, four of the six specimens were normal on gross and microscopic examination, and one was normal on gross inspection but was included in the group of three cases in which there was evidence of mild inflammatory change on microscopic examination. The specimen in the other case of recurrent ulcer following pyloroplasty revealed gross and microscopic evidence of diffuse gastritis. In this case the recurring duodenal ulcer in the anastomosis that had been made at pyloroplasty had produced pyloric obstruction.

It would seem, therefore, that we had obtained proof of a difference in pathologic changes associated with duodenal ulcer in the two groups of patients, namely, those operated on in Germany and those operated on at The Mayo Clinic.* With the infrequent occurrence of gastritis in our cases, it would seem that gastritis as an etiologic factor in the development of duodenal or gastrojejunal ulceration is not of great importance; surely its presence was not necessary for the development of duodenal ulcer in our cases.

---

*We believe, in this connection, it is of interest to note that Sebening,[16] of Frankfort, who spent six months at the clinic, came to a decision similar to ours, namely, that gastritis occurred infrequently among patients with duodenal ulcer who had undergone operation at the clinic as contrasted with the almost constant presence of associated gastritis among patients operated on in Schmieden's clinic.

Gastritis, a Phenomenon of Obstruction

One might speculate at length as to why gastritis occurred among patients in Germany and not among those operated on in Minnesota. Differences in climate, habits of living, and nutritional states may play important parts in the problem. A similar difference in incidence in certain other types of lesions customarily treated by surgical procedures is apparent in different parts of this country, such as in cases of goiter, but there are certain factors, we believe, which will explain the development of gastritis among patients in Germany. Among these are the relatively late periods in the course of duodenal ulcer at which the German patient is operated on, and the apparently greater extent of duodenal ulceration among German patients. It was not uncommon to see, among German patients, duodenal ulcers of large size which had produced marked degrees of obstruction of the duodenum and had penetrated into surrounding structures. That such ulcers are entirely the result of delay in treatment, we are inclined to question very much indeed. The fact remains, however, that German patients had a much more severe degree of duodenal ulceration than those we are accustomed to see in The Mayo Clinic.

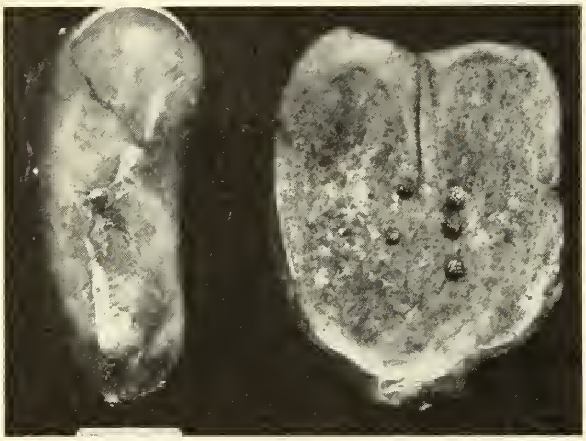


Fig. 1. Hemorrhagic inflammation of wall of gallbladder, the result of obstruction of the cystic duct by stones.

In speculating on this problem it occurred to us that, with large ulcers of this type producing pyloric obstruction, hypertrophy of the gastric wall, with edema and inflammation, might result. A similar phenomenon of associated inflammation due to obstruction is well recognized in acute obstructions of the cystic duct by stone which result in hydrops of the gallbladder, with marked inflammation of its wall (Fig. 1). We have recently seen ulcerating lesions in the mucous membrane of the gallbladder in a case of obstructive jaundice due to a malignant lesion of the pancreas, and this, too, in the presence of an alkaline fluid. Returning, however, to the idea that gastritis might be a phenomenon of obstruction, it occurred to us that it would be worth while to remove sections of the stomach for microscopic examination when pyloric obstruction was present, both in cases of benign and malignant disease, and to contrast them with other cases in which pyloric obstruction was not present.

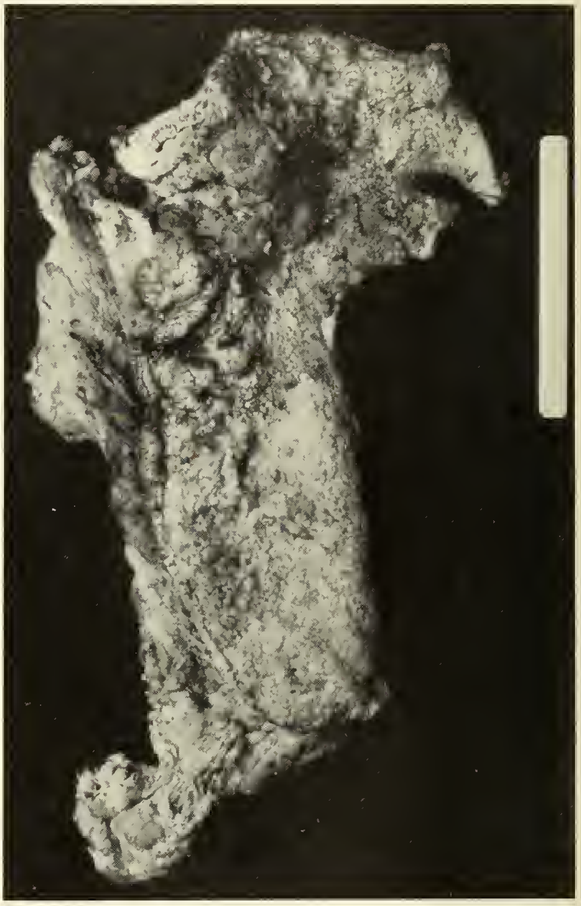


Fig. 2. Portion of stomach resected for obstructing carcinoma of the pylorus; hemorrhagic gastritis is apparent throughout the gastric mucous membrane.

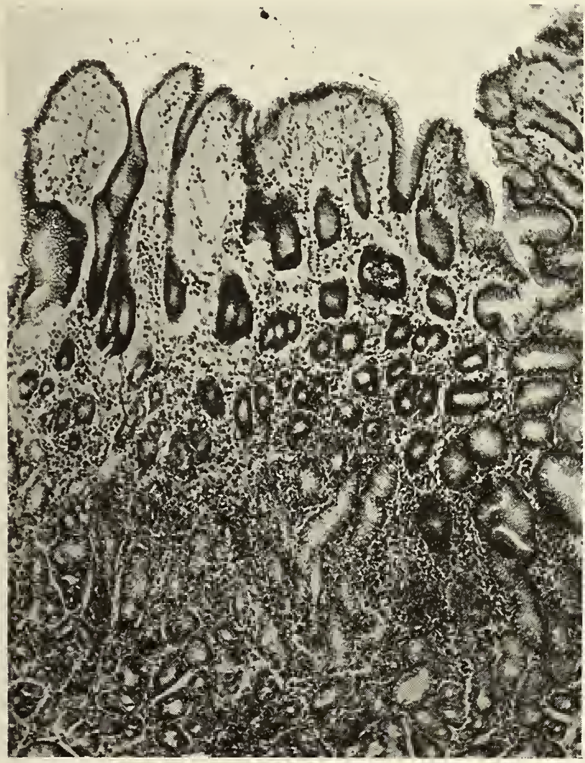


Fig. 3. Portion of gastric wall of patient with pyloric obstruction due to carcinoma. Evidence of gastritis may be noted throughout gastric wall by presence of a large number of leukocytes (× 60).

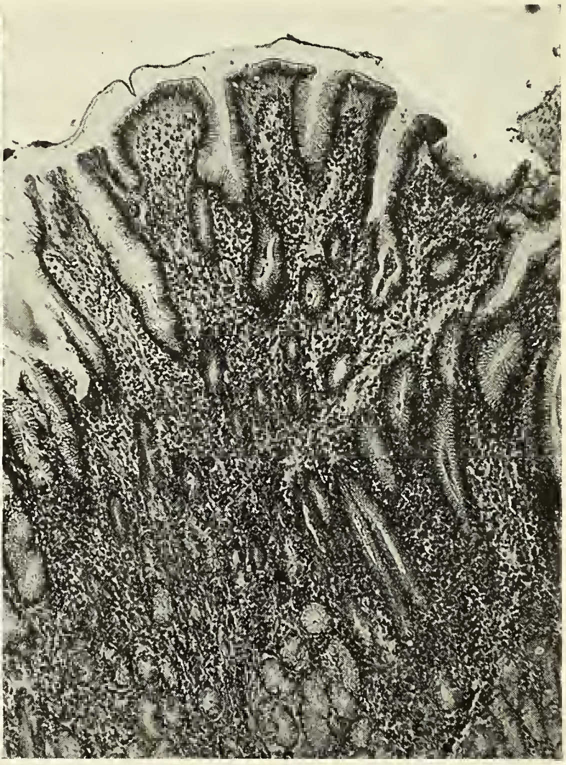


Fig. 4. Hemorrhagic gastritis secondary to obstructing carcinoma of the pylorus (× 60).

Gastritis Associated With Obstructing Carcinoma of the Pylorus

In reviewing our cases of duodenal ulcer in which ulcerative or hemorrhagic gastritis was associated, it was noted that the duodenal ulcer was producing a considerable degree of duodenal deformity or stasis and that gastric retention was apparent clinically. We also had observed in many cases of obstructing carcinoma of the pylorus that thickening and edema of the gastric walls occurred proximal to the obstructing lesion. This led to the supposition that these changes in the stomach were inflammatory and the result of the pyloric obstruction. The interior of the stomach in these cases had the edematous, hemorrhagic appearance of gastritis. Following partial or subtotal gastrectomy, sections were removed from various parts of the resected stomachs; these were examined microscopically in twelve cases of obstructing carcinoma of the pyloric end of the stomach and revealed gastritis in eleven cases, or 92 per cent (Figs. 2, 3 and 4).

Interestingly enough, eleven of the twelve patients were males, the ages varying from forty to seventy-seven years (Table I). In seven of the twelve cases the history of dyspepsia was of less than nine months' duration and the longest history was of thirty years' duration. In all of these cases vomiting had been a marked symptom, and marked degrees of gastric retention were demonstrated in most of the cases by gastric analysis. Free hydrochloric acid was present in nine of the twelve cases and was absent in two; in one case determinations of gastric acidity were not made.

Gastritis Associated With Nonobstructing Carcinoma of the Pylorus

In view of the finding of the high incidence of gastritis associated with obstructing malignant tumors of the stomach, it seemed advisable to study a control series of twelve cases of carcinoma of the stomach in which obstruction was not present (Table II). In all of these cases the malignant nature of the lesion was demonstrated by microscopic examination after its removal by

TABLE I. CARCINOMA OF THE STOMACH WITH PYLORIC OBSTRUCTION

Case					Gastric acidity					
Number	Age, years	Sex	Duration of symptoms	Duration of retention vomiting*	Combined acids	Free hydrochloric acid	Gastric content, c. c.	Operation	Situation of lesion	Microscopic examination gastritis graded
1	40	M	1½ years		60	50	300	Posterior Polya	Pylorus	Negativ
2	67	M	3 months	1 month	30	16	800	Posterior Polya	Pylorus	2
3	48	M	3 months	3 months	18	0	1,200	Posterior Polya	Pylorus	2
4	64	M	4 years	**	20	12	375	Posterior Polya	Pylorus	1
5	63	M	5 months					Posterior Polya	Pylorus	1
6	55	M	8 months		34	8	410	Posterior Polya	Pylorus	Subacute 1
7	70	M	6 months	2 weeks	56	0	600	Posterior Polya	Pylorus	Subacute 1
8	64	M	2 months	6 weeks	22	10	750	Posterior Polya	Pylorus	1
9	71	M	3 months	3 months	64	14	3,020	Billroth II	Polyrus	Acute 2
10	77	F	30 years	1 month	50	20	950	Billroth I	Pylorus	Chronic 1
11	50	M	10 years		52	26	620	Posterior Polya	Pylorus	2
12	58	M	4 years		60	42	200	Billroth I	Incisura (2 cm.)	e

*Retention vomiting present in all cases.
**Grade 2.

TABLE II. CARCINOMA OF THE STOMACH WITHOUT PYLORIC OBSTRUCTION

Case				Gastric acidity					
Number	Age, years	Sex	Duration of symptoms*	Combined acids	Free hydrochloric acid	Gastric content, c. c.	Operation	Situation of gastric lesion	Microscopic examination gastritis graded
1	68	M	1 year	48	36	150	Posterior Polya	Lower curvature	
2	43	M	2 years	56	40	150	Posterior Polya	Pylorus	Negative
3	49	M	5 months	6	0	30	Posterior Polya	Pylorus	2
4	46	M	30 years	82	72	160	Posterior Polya	Lower third	Negative
5	69	M	18 months	20	0	42	Total gastrectomy	Upper third	1
6	80	M	5 years	4	0	35	Posterior Polya	Middle portion	Negative
7	67	M	1 year	34	26	150	Posterior Polya	Upper third	Negative
8	70	M	15 months				Billroth I	Middle and upper third	Negative
9	63	F	2 years	24	12	100	Posterior Polya	Pylorus (5 cm.)	Negative
10	49	M	1 year	58	44	80	Posterior Polya	At angle (3 by 3 cm.)	Negative
11	40	F	8 months	54	40	90	Posterior Polya	High on posterior wall	Negative
12	52	M	2 months	48	28	70	Posterior Polya	Upper third (2.5 by 2.5 cm.)	Negative

*Retention vomiting was absent in all cases.

partial gastrectomy. The lesions measured from 1 to 3 cm. in diameter. Grossly, gastritis did not appear to be present except within a radius of 1 cm. of the lesion. This was borne out on microscopic examination of specimens removed from various parts of the stomach in ten, or 83 per cent, of the twelve cases. The ages of patients in this group were similar to those in the other group, ranging from forty to eighty years. There were ten men in this group. Similarly, free hydrochloric acid was present in eight of the twelve cases, and a history of dyspepsia varied from two months to two years, although one patient gave a history of having had gastric dyspepsia for thirty years, and another for five years.

Experimental Production of Gastritis by Obstruction of Pylorus

Working, therefore, on the hypothesis that gastritis is a phenomenon of pyloric or duodenal obstruction, Dr. Church and I have been attempting to produce lesions of gastritis in animals. The method employed consists in partial obstruction of the pyloric end of the stomach by constricting fascial bands. In half of the dogs in the group, gastric secretion was stimulated by administration of histamine. Work on these experimental problems is in too early a stage to allow any definite decision to be reached regarding the efficiency of our method of producing partial pyloric obstruction. It is our hope, however, that we may be able, by one method or another, to produce lesions of gastritis subsequent to the formation of pyloric obstruction, and also to determine whether or not relief of the obstruction by gastro-enterostomy will cause the gastritis to disappear.

While we were studying this problem, Dr. Dragstedt, of Chicago, presented in a Mayo Foundation lecture some interesting data on experimental production of peptic or, as he called them, acid ulcers of the stomach. As a complete report of these studies undoubtedly soon will be published by him, we feel that only the briefest reference to his material should be made at this time. By producing, experimentally, an isolated gastric pouch, he obtained pure gastric juice from it through a metal cannula. By closing the cannula, obstruction to the flow of gastric juice from the pouch resulted in development of chronic, progressive perforating ulcers, anatomically similar to clinical lesions. Quoting from Dragstedt: "In one experiment in which pneumonia occurred forty-eight hours after operation, several superficial ulcers were found and the entire mucous membrane presented numerous small hemorrhagic erosions." Our interpretations of his deductions are that ulcerations of the stomach and duodenum are produced by the irritating action of pure gastric juice, with a concentration of free hydrochloric acid of fifty units or more (between 0.1 and 0.15 per cent) on a gastric wall, the physiologic function of which is interfered with as a result of obstruction.

This contribution of Dr. Dragstedt's appears to us to be of outstanding value. It lends further support to the work of Mann,[11,12,13] Bollman and others, who previously have emphasized the importance of the acid factor in the production of experimental gastric and duodenal ulceration. It supports directly our own contention that gastritis is a phenomenon of pyloric or duodenal obstruction, but further, and from a practical standpoint, it would lead to the conclusion that any reduction in the incidence of gastrojejunal ulceration obtained by subtotal gastric resection, under and below that following gastro-enterostomy, is due to a greater reduction of gastric acidity occurring subsequent to subtotal gastrectomy.

Summary

In microscopic examination of specimens removed from stomachs resected during the course of operations for duodenal ulcer, associated gastritis was found in but few instances. In studies made of obstructing gastric lesions, it appeared that gastritis occurred in association with pyloric obstruction in a high percentage of cases and was absent when pyloric obstruction was not present. To confirm this clinical impression, a group of cases in which there were obstructing carcinomas of the stomach was studied, and microscopic evidence of gastritis was found in 92 per cent of the cases. A study was made of a control group of patients who had carcinoma without obstruction, who were of similar age and distribution by sex, and whose symptoms were of similar duration. Gastritis was absent in 82 per cent of cases. Studies are in progress at the present time, to determine whether gastritis can be caused experimentally, by producing various degrees of pyloric obstruction with fascial bands.

Bibliography

1. Anschütz, Willy and Konjetzny, G. E.: Die Geschwülste des Magens, Stuttgart, Ferdinand Enke, 1921, 387 pp.
2. Aschner, P. W., and Grossman, Sidney: Gastritis and duodenitis in relation to the ulcer problem; a study of 124 cases of partial gastrectomy. Surg., Gynec. and Obst., 57:334-342, (September) 1933.
3. Balfour, D. C.: Results of gastro-enterostomy for ulcer of the duodenum and stomach. Ann. Surg., 92:558-562, (October) 1930.
4. Berg, A. A.: Mortality and late results of subtotal gastrectomy for radical cure of gastric and duodenal ulcer. Ann. Surg., 92:340-366, (September) 1930.

5. Finsterer, H.: Die chirurgische Behandlung des Magen-und Zwölffingerdarmgeschwüres und seiner Komplikationen. Ergebn. d. ges. Med., 15:431-566, 1931.
6. Konjetzny, G. E.: Die Entzündliche Grundlage der typischen Geschwürsbildung im Magen und Duodenum. Berlin, Julius Springer, 1930, 155 pp.
7. Konjetzny, G. E.: Die Pylorushypertrophie des Erwachsenen als selbständiges Krankheitsbild. Med. Welt., 6:728-730, (May 21) 1932.
8. Konjetzny, G. E., and Puhl, H.: Das sogenannte Ulcus pepticum des Magens der Absatzkälber. Virchow's Arch. f. path. Anat. u. Physiol., 262:615-633, (December) 1926.
9. Lewisohn, R.: Operative results in partial and subtotal gastrectomy for gastroduodenal ulcers. Ann. Surg., 91:520-525, (April) 1930.
10. Louria, H. W.: The surgical treatment of gastric and duodenal ulcer. Surg., Gynec., and Obst., 47:493-502, (October) 1928.
11. Mann, F. C.: Chemical and mechanical factors in experimentally-produced peptic ulcer. Tr. Assn. Am. Phys., 42:224-227, 1927.
12. Mann, F. C.: Experimentally produced peptic ulcer. Proc. Inst. Med., Chicago, 7:25-28, (Mar. 15) 1928.
13. Mann, F. C., and Bollman, J. L.: Experimentally produced peptic ulcers; development and treatment. Jour. Am. Med. Assn., 99:1576-1582, (Nov. 5), 1932.
14. Orator, Victor: The Billroth I resection of the stomach. Surg., Gynec. and Obst., 47:368-374, (September) 1928.
15. Puhl, H.: Zur Pathologie und Klinik des Ulcus duodeni. Deutsch. Ztschr. f. Chir., 207:202-248, 1927.
16. Sebening, Walter: Why partial gastric resection is preferred for peptic ulcer in Germany. Proc. Staff Meetings of Mayo Clinic, 7:139-142, (Mar. 9) 1931.
17. Starlinger, F.: Ulcus pepticum postoperativum. Ergebn. d. Chir. u. Orth., 25:380-476, 1932.
18. Walters, Waltman: The choice of surgical procedures for duodenal ulcer. Ann. Surg., 96:258-268, (August) 1932.
19. Walters, Waltman, and Sebening, Walter: A comparison of lesions associated with duodenal ulcer in Germany and in the United States. Minn. Med., 15:579-584, (September) 1932.
20. Walters, Waltman, and Snell, A. M.: Peptic ulcer as seen in central Europe. Proc. Staff Meetings of Mayo Clinic, 6:380, (June 24) 1931.

PATHOLOGIC FACTORS IN THE CURABILITY OF CARCINOMA OF THE COLON*

LAWRENCE M. LARSON, M.D. Ph.D.

Assistant in Surgery, University of Minnesota

Minneapolis

LITERATURE regarding malignant lesions of the bowel has been abundant and it is doubtless true that hardly a phase of this disease has been neglected by writers at some time or other. What is to be added to the already voluminous publications on this subject seems to be justified from the standpoint of further describing and elaborating upon some of the pathologic factors which bear a relation to the curability of this dreaded disease.

A number of studies have been made in which it has been shown that grading of the degree of malignancy of tumors is of considerable importance in determining prognosis as to duration of life, incidence of metastases, radiosensitivity of the tumor and extent of the lesion. These data are not of as much value in the forecasting of events in any one case as in their application to a large group. There are so many exceptions to the rule that prognostication in individual cases is not possible. This is more or less true for all malignant lesions regardless of their location, but is especially noticeable for carcinoma of the colon, where the grading of the tumor as to its degree of differentiation seems to be of somewhat less relative value and possibly of less importance; consequently other data must be taken into consideration in determining the type of treatment indicated as well as the eventual outcome of the disease. This fact is well illustrated in a case reported by Raiford in which local excision only of skin nodules from a highly malignant epitheliomata of the anus resulted in a seven year cure.

Influences which modify the prognosis in cases of carcinoma of the bowel may be grouped (Rankin and Olson) into extrinsic and intrinsic factors as follows:

---

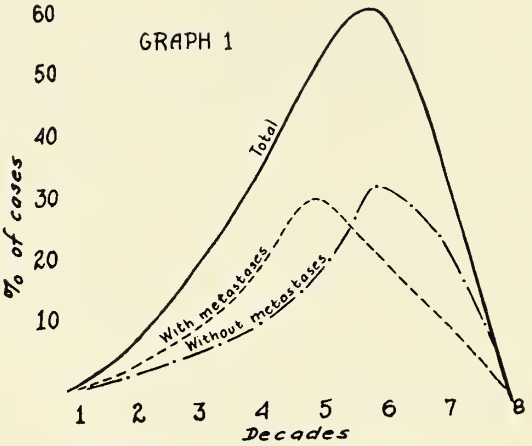
*Presented before the Minnesota State Medical Association, Duluth, July 18, 1934.

I. Extrinsic
  1. General
    - Age of patient
    - Loss of weight
    - Anemia
    - General debility
    - Cardiovascular and renal impairment
    - Coexisting chronic debilitating diseases such as diabetes and tuberculosis
    - Duration of growth
    - Direction of growth
    - Glandular metastasis
    - Lymphocytic infiltration
    - Fibrosis
    - Hyalinization
  2. Local
    - Size
    - Fixation
    - Perforation: with or without abscess or formation of fistula.

II. Intrinsic
  1. Activity of the neoplastic cells, especially their ability to differentiate or approach the normal state.

At the head of the list of extrinsic influences stands that of the age of the patient and in the determination of prognosis this factor probably has practically as much bearing on the eventual outcome as that of degree of malignancy. Rankin emphasized this in stating that "young tissues so potent in resistance to acute fulminating infectious processes are helpless to withstand the formidable offense of cancer. Their vital elasticity and resilience is far less hostile to neoplastic invasion than that of the tissues of senescence." This was adequately proved in a series of 753 cases in which he showed that the total good results in young individuals were 50 per cent less and the total poor ultimate results 20 per cent more than in a group of patients of all ages taken together. In the following data the importance of the significant influence of age is again borne out.

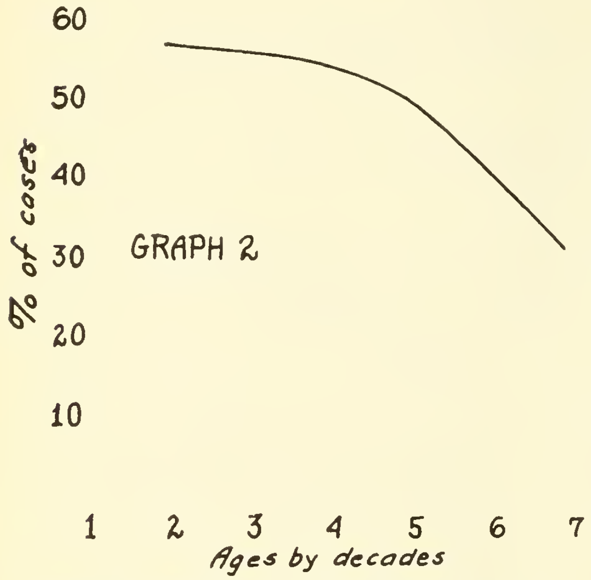
The age of the patient, however, is not the all-important factor in determining the prognosis. If it were, biopsy of malignant lesions, such as those of the anus, rectum and rectosigmoid would be practically valueless, whereas this is one of the most indispensable of any of the diagnostic procedures. Many times the outcome of the biopsy determines whether or not surgical measures, radiotherapy, or a combination of both is to be employed, because when adequate knowledge of the morphologic characteristics of a tumor is known, its histogenesis, degree of malignancy, metastasizing power, and radiosensitivity can be estimated with more than a fair degree of accuracy. In this connection it should be remembered that radiosensitivity must be differentiated from radiocurability. The highly undifferentiated lesions, or those of high degree of malignancy, melt away rapidly under radium therapy but they recur early and persistently as well as possess a strong tendency to metastasize widely in a relatively short time, so that they kill with just as great or even greater frequency than tumors which are spoken of as being radioresistant.



PERCENTAGE OF CASES WITH AND WITHOUT METASTASES BY AGE GROUPS

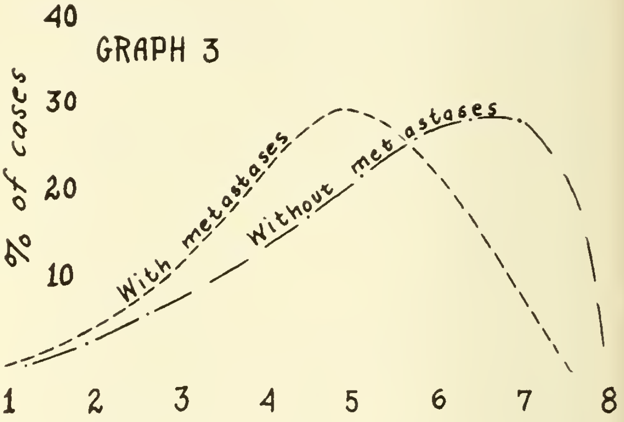
In order to elaborate upon the factor of age as an influence in the prognosis of carcinoma of the colon, a series of 210 consecutive cases of this disease in which there were complete necropsy data were taken from the records of the Department of Pathology, the University of Minnesota. In this group of 210 cases there were seventy-seven in which there were absolutely no metastases or extension of the growth to be found at postmortem examination. Of the cases with metastases there were an additional thirty-six in which there was a limited extension of the growth or only a few small regional glands involved, so that it would seem that a reasonable chance existed that the lesion was probably an operable one. The remaining ninety-seven cases represented instances in which there was extensive fixation, distant metastasis, or otherwise a locally inoperable lesion.

The age incidence of the various groups is plotted in Graph 1. The number of cases in the first three decades is too small to justify conclusions. However, beyond the fourth decade, the number is large enough to warrant important deductions. Those patients in the younger age groups have a definitely greater incidence of metastases than those in the older groups. The peak of the incidence of cases where metastases are present is approximately one decade earlier than where none are present; in other words an individual at the age of sixty who harbors a malignant lesion of the colon has a much better chance of operability, other factors being equal, than one at the age of fifty. This fact is again shown in Graph 2, which shows the percentage of cases at various ages presenting metastasis. The tendency to slow growth in an elderly individual is further emphasized in Graph 3 in which the untreated cases are illustrated. This group of cases represents all patients who died from carcinoma of the large bowel without surgical intervention, radiotherapy, or other forms of treatment undertaken to cure or palliate the disease. In this graph the peak of incidence of those cases without metastases comes in the seventh decade, indicating a slower growth. Those with metastases reach a height of incidence in the fifth decade, again emphasizing the point that metastases are much more frequent and that growth is more rapid in younger patients.



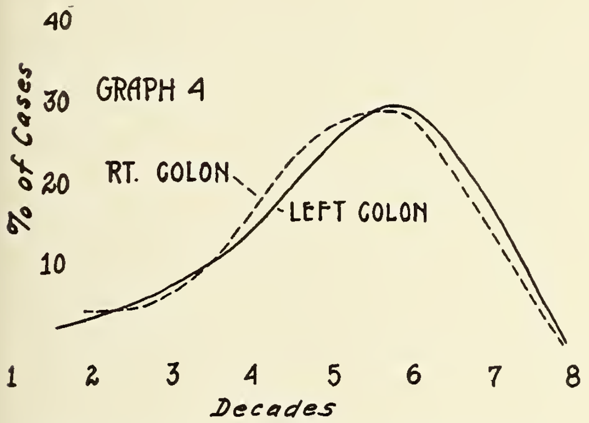
PERCENTAGE OF CASES AT VARIOUS AGES PRESENTING METASTASES

The fact that malignant tumors grow more rapidly in young patients must be accounted for either on the basis of a difference in the properties of the host itself, or on variations in structure of the tumor. Whether one or both of these two factors are responsible is a disputed issue. However, one point has been pretty definitely shown by Shields and Warren in their review of 5,052 epidermoid carcinomata in which they found that the relative frequency of grades of malignancy remained the same in each age decade. This would seem to indicate a relatively less importance of the structure of the tumor as compared to the resistant properties of the tissues of the host, and from the figures shown above there would seem to be convincing evidence that the resistance of the host directly increases as the patient grows older.



INCIDENCE OF UNTREATED CASES BY DECADES

In Graph 4 the incidence of lesions in the right and left colon according to age is plotted. It indicates no essential difference in the incidence of right or left colon lesions, except possibly a slightly younger age group for lesions of the proximal large intestine. This can hardly be considered significant since it is so slight, yet it does confirm an old impression that malignant lesions in the very young are frequently located in the right colon. In Graph 5 the percentage of lesions in various portions of the large intestine is plotted according to the exact anatomical location of the lesion, and illustrates graphically the preponderance of cases occurring at the two extremities of the colon, with a definitely lower number in the mid-portion of the large gut. There is also plotted in this same figure the relation of incidence of metastases to the location of the lesion. According to these figures, there is no significant difference in the percentage of metastases no matter where the primary lesion is located, with the possible exception of the cecum and ascending colon. This series of cases is not large enough to be of great value but does show that possibly a relatively fewer number of cases present metastases when the primary lesion is in this portion of the gut. The reason for this is not clear but it is a fact which is well known to surgeons, since cures in carcinoma of the right colon are somewhat more frequently obtained than in lesions of the left colon and rectum (Rankin).

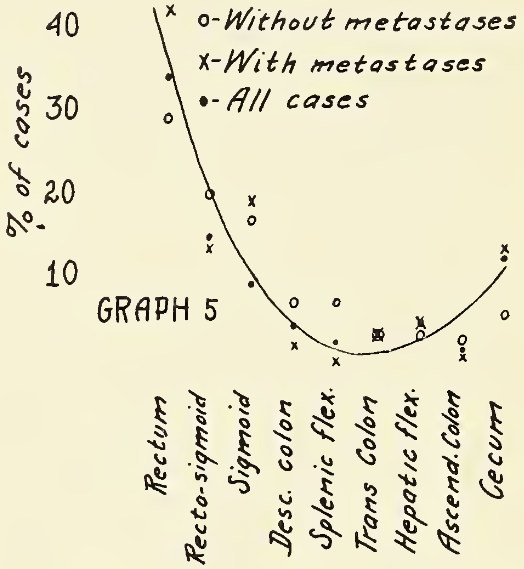


INCIDENCE OF LESIONS OF RIGHT AND LEFT COLON ACCORDING TO AGE

Other local factors are of considerable importance in determining the type of therapy as well as the prognosis in cases of carcinoma of the large intestine, and must not be lost sight of in the management of this disease.

1. *Location of tumor.*—It is axiomatic that an accurate diagnosis as to the location of the tumor must be made and this is especially true of lesions in the distal colon. Whether a tumor is located in the rectum, rectosigmoid or sigmoid makes a tremendous difference in the surgical maneuver to be carried out, because of the difference in accessibility, in extension of the lesion and in the location of metastases. In the remaining segments of the large intestine, localization of the tumor can be done fairly accurately since in practically all instances either roentgenograms with opaque enemata are available, or preliminary exploration has been carried out.

2. *Obstruction.*—Another local factor of tremendous importance is the degree of obstruction produced by the tumor. In the left colon obstruction is an early accompaniment, and is due to a number of factors. Growths in this location are more likely to be of the annular type, the diameter of the bowel here is smaller, the fecal content is formed, and the movements in this portion of the gut are of the large, forceful, propulsive type (Larson and Bargen). Obstruction is more likely to occur, too, especially where flexures are present such as at the splenic and rectosigmoid regions. This was borne out in the present series of cases where tumors in the two named regions practically uniformly resulted in obstructive symptoms. The opposite conditions all hold true for growths in the proximal half of the colon, because here the lumen of the bowel is wide and capacious, the contents are always liquid in nature, and the movements in this segment of the gut are small, rapid churning ones intended to aid in absorption. Furthermore, growths in this area usually are large, flat, and ulcerating, additional factors favoring absorption of toxic products. Therefore in this region the early symptoms, and sometimes the only ones, are



INCIDENCE OF LESIONS OF COLON ACCORDING TO LOCATION those of disturbance of physiologic equilibrium such as anemia, toxemia, weakness, and loss of weight. Many of these individuals complain of symptoms suggesting recurrent attacks of appendicitis, cholecystic disease or peptic ulcer. Additional reason for the difference in the two locations may be understood from a study of the embryology of this region. The right half of the colon is developed from the mid-gut along with the small bowel, while the left is a reservoir or storage segment and is derived from the hind gut.

Tumors in the transverse colon rarely produce the severe anemia seen with those of the proximal large intestine, but they likewise uncommonly give rise to obstructive phenomena. Although the tumors here are usually of the "napkin ring" type, yet, since the content is fluid, obstruction does not supervene until almost complete closure develops. Symptoms are particularly liable to be referable to disease in the stomach, and to a less extent the gallbladder, because direct extension to the glands of the stomach and omentum through the mesocolon is usually early. Metastasis to the liver is likewise early.

Lesions in the rectosigmoid early give rise to obstruction, a fact which can readily be appreciated from a consideration of its anatomical structure. This region is the point at which the sigmoid joins the rectum, not in a straight line, but at an angle. When the longitudinal muscular bands on the peritoneal surface of the sigmoid spread out to grasp and completely surround the entire rectum, there is produced a fixed point with a definite narrowing, and since there is practically no mesentery in this area, a virtual sphincter is said to exist. However, no sphincteric muscle has actually ever been demonstrated at this point although it is true that there is a mechanism here similar to the pyloric sphincter, tending to retard the fecal current and acting in much the same manner as the pylorus. Obstruction takes place early, and usually the patient is aware of his disease at an earlier date than with tumors located elsewhere in the colon. As regards metastases, the lymphatic drainage of this particular area, (demonstrated so beautifully by Miles) and the extent of operation necessary for a lesion situated here, emphasizes again the need for accurate localization of the tumor. This brings out again the importance of carrying out digital and proctoscopic examination on individuals with complaints suggesting disease of the colon. In this particular series of cases, 107 of the 210 malignant tumors occurred in the anus, rectum, and rectosigmoid, regions which are readily accessible to the proctoscope, and an additional thirty-three were located in the sigmoid, a place which frequently can be visualized, so that well over half of all these tumors of the colon could be diagnosed by inspection alone. This is an important fact when one considers the high incidence of cases which come undiagnosed to operation or necropsy, and likewise that large group of patients with carcinoma of the rectum who are operated upon for hemorrhoids. The significance of obstruction in relation to treatment of lesions of the colon demands special consideration. Briefly it may be stated that preliminary measures for the surgical management of left colon lesions are directed toward a correction of obstruction, dehydration, debilitation and starvation, while with those of the right colon, treatment is concerned mainly with anemia and toxemia.

3. *Size and direction of growth of lesion.*—While the size of a lesion frequently has a direct relation to its resectability, yet the incidence or possibility of metastasis is not in ratio to this characteristic. In other words some of the largest lesions have no extension and conversely a small tumor may have extensive and widespread metastases. The direction of growth as shown by Rankin and Olson has considerable bearing on the ultimate prognosis. Treatment of tumors which grow into the lumen of the gut is attended with better results than in those which extend toward the serosa. These authors found that the former group are more likely to be of the papillary type and of a lower degree of malignancy while the latter are closer to the lymphatic glands, are of a higher grade of malignancy, and metastasize at an earlier date.

4. *Amount of fixation of tumor.* Fixation is brought about more frequently by extension of inflammatory processes than by an actual invasion of the surrounding structures by the neoplastic tissue; therefore, even in the presence of extensive fixation it is often possible to render an otherwise inoperable growth an operable one by side-tracking the fecal current. With ileostomy, cecostomy, or colostomy, preliminary to a resection of the growth, irrigation of the diseased area is made possible and is of considerable aid in reducing inflammatory changes. The advan-

tages of multiple stage operation in these cases are obvious, since inflammatory changes are reduced, obstruction relieved, and the patient develops a resistance to the infection, all factors which reduce the operative risk. It is frequently possible in patients who are good surgical risks to resect portions of the bladder, and all or part of the prostate, seminal vesicles, uterus and vagina, along with the neoplasm. It is furthermore highly desirable that infection around the growth be reduced to a minimum because permeability of the colon is very high when there is a combination of even a small degree of obstruction with ulceration, tending to favor the spread of peritonitis. Leakage of suture lines and pulling apart of anastomoses are factors that probably are less responsible for peritonitis than manipulation of the growth. The latter often results in extravasation of organisms into surrounding tissues.

The cause of death in this series of 210 cases is of interest.

TABLE I

Cause of Death	With Metastases	Without Metastases
Surgical: peritonitis, ileus, shock, hemorrhage, etc.	44	42
Exhaustion	48	2
Spontaneous perforation	11	11
Obstruction	8	10
Cardio-renal-vascular	14	6
Pulmonary disease	7	0
Secondary anemia	0	2
Death by accident	1	4
	—	—
Totals	133	77

From this table it will be seen that where death followed a surgical procedure the percentage was considerably higher in cases without metastases, suggesting that the surgeon attempted a more extensive operation. Where metastases were present, the resistance of the patient was lower because of the deleterious toxic effects of the tumor and even the smallest operations were accompanied with a greater chance of peritonitis, ileus, shock and so forth. Patients with metastases less often came to operation than those without metastases, so that this would tend to increase the incidence of deaths from operation in the latter group. Obstruction as a primary cause of death took place more frequently in cases in which there were no metastases, frequently a direct sequel to operative maneuvers. When the latter were excluded, obstruction occurred with practically the same incidence regardless of the presence or absence of metastases. Cardio-renal-vascular diseases were present in very nearly the same percentages in both groups of cases, while pulmonary disorders such as broncho-pneumonia and tuberculosis were much more frequent in the long drawn out cases, for death took place so slowly in the presence of metastases that lowering of resistance was a sizable factor in inducing complicating diseases.

Summary

1. The factor of age in determining the prognosis as well as the incidence of metastasis in a large group of cases of carcinoma of the colon is an important one, and should be considered in the same light with grading of the lesion, size of the tumor, and direction of growth of the neoplasm.

2. In a group of 210 cases of malignant lesions of the large intestine coming to necropsy, there were 77 (37 per cent) in which no metastases could be demonstrated. Many of these individuals died without treatment directed toward cure of the disease. Those who came to autopsy before metastases occurred were preponderantly in the later age groups, and conversely in the younger patients dying of this disease there was a relatively greater incidence of metastases. In other words, the older the patient who develops carcinoma of the colon, the greater are his chances for having a locally operable lesion.

3. In 113 of the 210 cases there were either no metastases at all or there were present only a few small regional glands which seemed reasonably amenable to resection; thus, well over half of the cases were locally operable. This gives further evidence as to the generally slow growing nature of tumors in the large bowel, especially in older individuals.

4. There was no significant difference between the occurrence of malignant lesions in the right or left colon in respect to the age of the patient. Furthermore, there was no difference in the incidence of metastases as compared to the location of the primary lesion in the right or left colon.

5. Besides the factor of age in determining

the prognosis and management of these cases one must take into consideration other pathologic factors such as accurate localization of the tumor, degree of obstruction present, size and direction of growth of the lesion, amount of fixation of the tumor, and grading of the degree of malignancy of the neoplasm.

6. These growths were located with the greatest frequency at the two extremities of the colon, and more than half of the total number could have been visualized through the proctoscope or sigmoidoscope since they were in the rectum, rectosigmoid or lower sigmoid. This is a significant fact when one takes into consideration the large number of these cases which come undiagnosed to operation or necropsy.

1737 Medical Arts Bldg.

Bibliography

1. Gates, O., and Warren, S.: The grading of epidermoid carcinoma. Surg., Gynec. and Obst., 58:962-967, (June) 1934.
2. Larson, L. M., and Bargen, J. A.: The physiology of the colon. Arch. Surg., 27:1-50, (July) 1933.
3. Miles, W. E.: Pathology of the spread of carcinoma of the rectum and its bearing upon the surgery of the cancerous rectum. Surg., Gynec. and Obst., 52:350-359, (Feb.) 1931.
4. Raiford, T. S.: Epitheliomata of the lower rectum and anus. Surg., Gynec. and Obst., 57:21-35, (July) 1933.
5. Rankin, F. W.: The curability of cancer of the colon, rectosigmoid, and rectum. Jour. Am. Med. Assn., 101:491-495, (Aug. 12) 1933.
6. Rankin, F. W., and Olson, P. E.: The hopeful prognosis in cases of carcinoma of the colon. Surg., Gynec. and Obst., 56:366-374, (Feb. 15) 1933.

THE PREOPERATIVE, OPERATIVE AND POSTOPERATIVE TECHNIC OF PROSTATIC RESECTION WITH THE DIRECT VISION COLD KNIFE INSTRUMENT*

GILBERT J. THOMAS, M.D., F.A.C.S.

Minneapolis

ATTEMPTS to relieve prostatic obstruction or the relief of obstructions that prevent the normal outflow of urine from the urinary bladder by means of instruments passed through the urethra, are not new or of recent origin.

Before the Christian era, there is evidence that instruments were made to pass through the urethra for the purpose of pushing aside, cutting or breaking up the obstructing prostate, although it was not until 1510 that we find a description of a definite operative procedure per urethram for the relief of prostatic obstruction. The instruments used and the results obtained during these early years were not successful because the anatomy, physiology and pathology of prostatic and other obstructions were not well understood.

The advent of electricity, which made illumination and visual examination of hollow organs possible, changed many of the early ideas which our predecessors had concerning prostatic obstruction. Recent additions to our armamentarium are high frequency and other electric currents which permit cutting in a water medium under the direction of the eye. These have again revived the attack on prostatic obstruction through the urethra, so that many instruments with the new ideas incorporated in them are now made for this purpose.

The modern instruments may be divided into three types:

1. Dr. John Caulk has perfected an instrument which incorporated at first direct, and later on indirect, vision with telescopes. He uses a circular knife made of iridio-platinum which cuts under water and is activated by a *low voltage cautery current.* This instrument contains the knife of the direct vision type and makes use of a cautery current, but not the high voltage current used in the instruments of group 3.

2. The direct vision instrument made by Braasch and Bumpus has no telescope or prisms. It is a straight, hollow tube with its end upturned as an ordinary cystoscope. Vision is obtained directly through an eyepiece of plain glass which fits into the outer end of the instrument. Lighting is produced by a small bulb inside the beak. Within the sheath of this resectoscope a circular knife and two electrodes may be introduced and

---

*Read before the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

withdrawn at will. The knife operates cold and is not connected with, activated or heated by an electric current.

3. Instruments that remove portions of the prostate by means of a wire loop or other shaped electrodes that are activated by a high frequency electric current. Indirect visualization is obtained through a telescope and by means of prisms. The angle of visual observation may be oblique, foroblique or right angle. These resectoscopes have a shape similar to the usual cystoscope or they may be a straight tube without a beak and are made of insulating material.

Because I have never been satisfied that the electric high frequency cutting current is as simple and localized in its effect on tissue as its proponents claim, I have used routinely the direct vision cold-knife cutting instrument as designed by Braasch and Bumpus.

A New Principle in Modern Surgery of the Prostate

The success of cutting electric currents in water and instruments for making use of them, and Dr. John Caulk's persistence in the use of his cautery punch for removing large sections, has introduced a new principle in modern surgery of the prostate gland. This experience has taught urologists that only that portion of the prostate that protrudes into the urethra and bladder neck and that interferes with the normal act of urination need be removed.

The greatest new field of usefulness that the modern instruments and electric currents open is what may be called the "Prophylaxis of Prostatic Hypertrophy." By this I mean the removal of the beginning enlargements of the prostate before the urethra and neck of the bladder become distorted. It is very probable that an early operation may prevent further hypertrophy and the distressing complications which may accompany continuing prostatic enlargement. Another group of patients within the prostate age with bladder neck contractions and prostatic bars, who were formerly not subjected to surgical treatment because no true prostatic enlargement was found, may now be resected. Complete relief from urinary symptoms may be expected following resection of this group.

I have found that these new methods, when used judiciously, may make it possible to remove sections of the prostate in patients who would be denied surgical treatment if it were necessary for them to submit to a suprapubic or perineal enucleation. They are always poor surgical risks and have a continuously low phenolsulphonephthalein and urinary output, a damaged heart or some other debilitating condition. They should always have a suprapubic cystotomy. I am careful not to submit them to a prolonged anesthetic or too much manipulation at one time. Following suprapubic drainage one is not forced to remove enough prostate at one sitting to relieve these patients completely; the anesthetic and the manipulation may be restricted to not longer than three-fourths of an hour. If more of the prostate must be removed a second and sometimes a third resection may be done.

I have found that cancer of the prostate is treated better by resection than any method we now have of controlling this very disagreeable condition. This method of operation will restore the patient's normal urinary facility, and in doubtful cases may obtain a satisfactory specimen for microscopic study. Following resection it is possible to use radium, x-ray, or whatever therapy seems best. If the resection has to be repeated it may not be a serious procedure for the patient.

Preoperative Preparation of Patients

Mortality may follow prostatic resection as it may follow prostatectomy, so that before resection I have continued the careful preoperative preparation practiced by all urologists who contemplate prostatectomy. Infection is still the complication that requires most attention, since it produces the greatest morbidity and mortality. The relief of residual urine is important, but when this is accomplished, without introducing infection into the blood stream via the urethra, it is not troublesome. When there is much urinary infection, with or without retention and when there is more than a little damage to the kidneys or the heart, a preliminary suprapubic cystotomy should be made. This suprapubic drain must remain until infection has been controlled, until kidney function has stabilized, and until the strength of the heart muscle has been evaluated. The most important of these conditions that must be controlled is urinary infection, particularly when the patient has a coëxisting pyelonephritis and cystitis. Repeated estimation of the number of pus cells in the urine is as important a factor as the phenosulphonephthalein output and blood chemistry values in determining when a patient is a safe risk for operation. When infection has reached the kidneys and when the pus cells do not decrease promptly following suprapubic drainage and the use of the usual urinary antiseptics, we use a ketogenic diet, together with urotropin and some acid salt by mouth. If these are given in sufficient amounts, the physical properties and the acidity of the urine, which should be a P_H of 5.2 or less, makes the urine bacteriostatic and sometimes bactericidal.

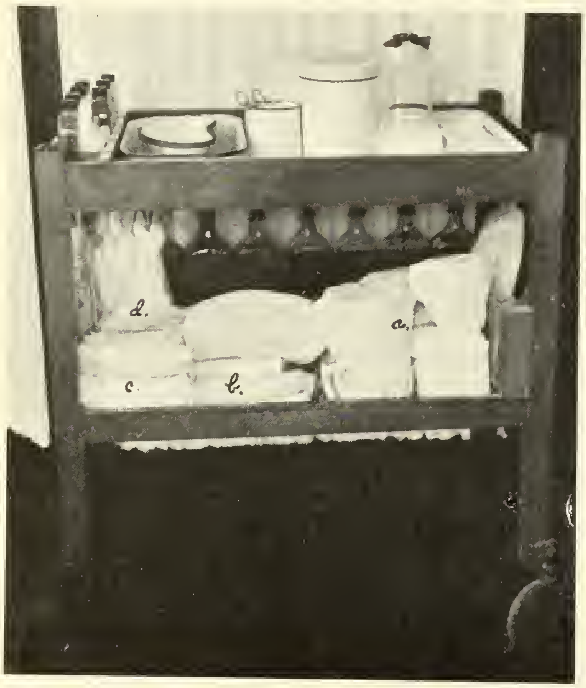


Fig. 1. Front view of Urological Treatment Cart.
- a. 1,000 c.c. enamel graduates for making solutions.
- b. Sterile glass syringes.
- c. Sterile instrument packages.
- d. Sterile gloves and dressings.

Patients with little residual urine, which is not infected, and blood chemistry and phenolsulphonephthalein output within the range of normal, may not require more than a few days preoperative preparation. Many urologists who contemplate prostatic resection require little, if any, preoperative treatment of the patient. Marked temperature rises and chills following resection occurred frequently with patients who did not have preoperative care and careful attention to the prevention of infection.

Prostatitis should be treated thoroughly before resection is done. Many patients are referred for resection who have an undiscovered prostatitis. If resections are done on this group, prostatic abscess is frequent and these patients continue to have a cloudy urine and practically no relief from their urinary symptoms for many weeks after resection.

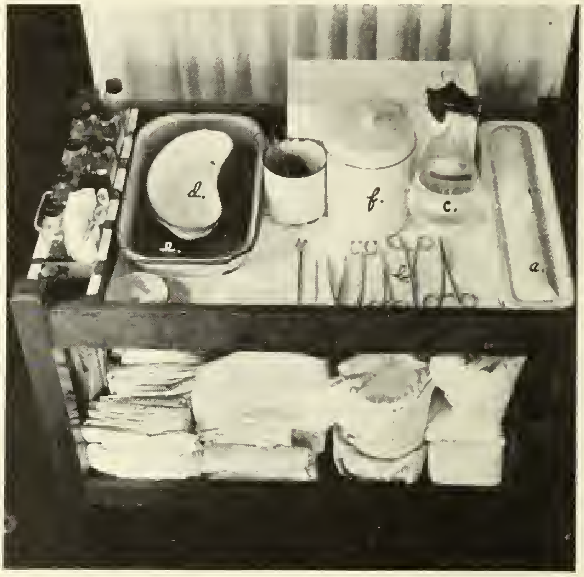


Fig. 2. Top view of Urological Treatment Cart.
- a. Container for various sizes and shapes of catheters which have been sterilized ready for use.
- b. Instruments in sterile instrument package spread ready for use.
- c. Glass flask containing sterile water for making solutions.
- d. Basins which receive returning irrigating solution from the bladder.
- e. Disposal basin for soiled instruments and dressings.
- f. Sterile container for rubber bulbs which fit glass irrigating syringes.

Partial Vasectomy

Epididymitis continues to be a very troublesome complication with resection so that I advise partial vasectomy before preoperative treatment is started.

Cystoscopy and Endoscopy

A careful cystoscopic and endoscopic examination of the neck of the bladder and the prostatic urethra is imperative. The surgeon must first determine that operative treatment is necessary and then decide whether resection or prostatectomy is the best method.

The preoperative technic of any method of prostatic resection must include the selection of patients best fitted for this type of surgical treatment. Some urologists, since the advent of the esectoscope, find surgical enucleation unneces- ary. I have found this attitude to be wrong. We annot fit the patient or the condition which he as to any operative procedure which we may eel like using. We must fit the procedure to the atient and the condition which he has. A very arge, intravesical, easily-bleeding gland may re- uire digital enucleation. Suprapubic prostatec- omy by competent surgeons who know and ap- reciate the necessity and importance of careful reoperative treatment will not take longer and will involve less risk than two or more resec- ion bouts. However, with the late improvements in technic, it is possible to resect the majority of hypertrophied prostates.

Anesthesia

The technic of prostatic resection much include the careful selection of an anesthetic. Spinal or caudal anesthesia may permit reflux of infected urine from the bladder to the kidney pelvis in normal individuals, because the uretero-vesical valve may be temporarily incompetent. If spinal or caudal anesthesia are used routinely, the average surgeon may forget the possibility of bladder overdistention. Recently I saw a patient who had a ruptured bladder, the result of rough manipulation, accompanying overdistension during spinal anesthesia. With general anesthesia, reflexes are retained so that the patient will force the dilating fluid through the urethra during overdistention. I have found nitrous oxide, plus ether when necessary, to be the safest and surest anesthetic when resection is to be done. The selection of the best and safest anesthetic for each patient must be made after all his physical conditions are evaluated and the operative and postoperative plans have been decided.

Technic of Resection

Before the actual resection is begun, some arrangement should be made for an unlimited and uninterrupted supply of an antiseptic solution which may be used to distend the bladder and to irrigate the urethra. This should be non-irritating, but antiseptic enough to control infection if it does not disinfect the bladder and the operated area. For this purpose I have used a 1 to 10,000 solution of oxycyanide of mercury. I had an arrangement of the water pipes built into my operating room, so that an irrigator may be continuously filled with this solution without disturbing the operation or the surgeon.

After the resectoscope has been passed through the urethra, a thorough inspection of the bladder, prostate and prostatic urethra must be made, so that the surgeon may know how much the lobes of the prostate are enlarged, how much tissue should be removed, and where the resection should be started. When the site for beginning the operation has been selected, the beak of the direct vision instrument is depressed so that a portion of the prostate protrudes through the fenestrum. The preresection coagulating apparatus, consisting of several needles held in an insulated obturator (see cut) is passed through the sheath of the resectoscope so that the needles protrude into the portion of the prostate which is caught in the fenestrum. The coagulating current is then turned on for a period of about five seconds. Without moving the resectoscope sheath, the coagulating electrode is removed, the circular knife is introduced and with a circular

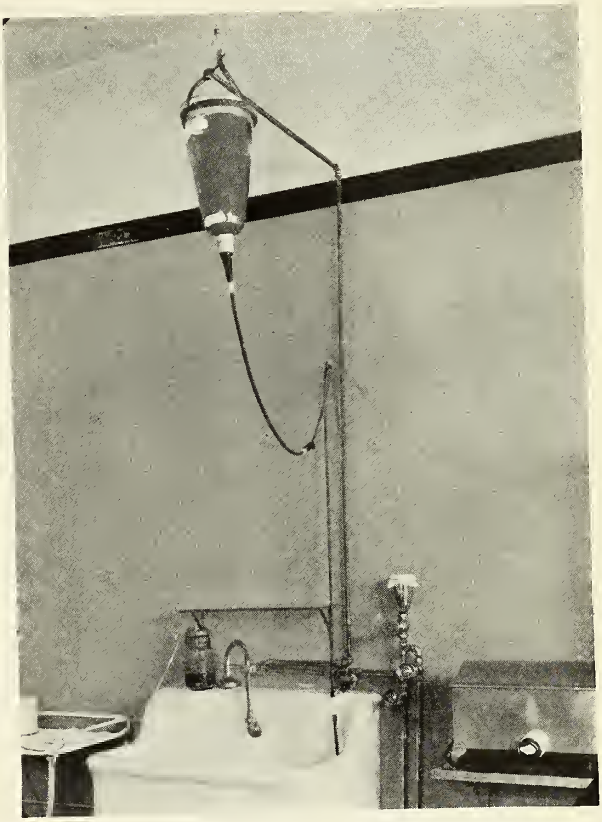


Fig. 3. A special arrangement of the water pipes in the Urological Operating Room which permits constant filling of the irrigator. A by-pass with filling funnel permits the easy introduction of some concentrated antiseptic solution which is diluted as the irrigator is filled.

motion the portion previously coagulated is cut away. If the knife is sharp and if it is rotated as it is pushed through the tissue, a clean cut results and a large core of tissue is removed. The bit of tissue is washed out immediately after the circular knife has been withdrawn or it may remain within the lumen of the knife.

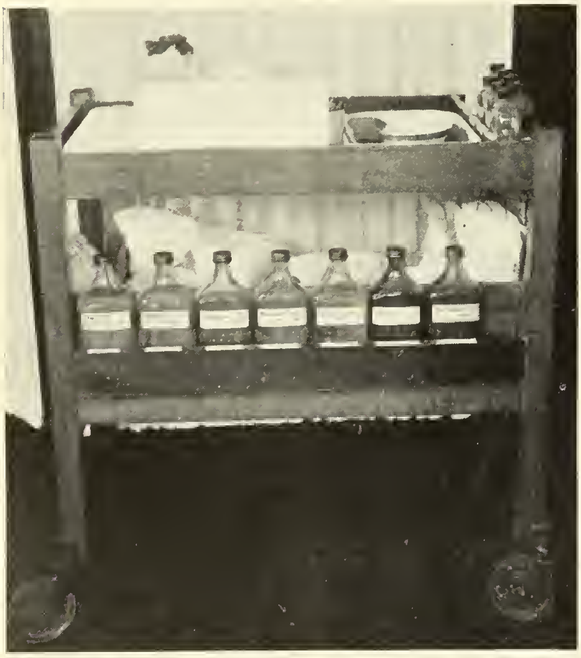


Fig. 4. Posterior view of Urological Treatment Cart showing stock solutions which may be used for irrigation.

After one or more sections of prostatic tissue are removed in this manner, the operated area is inspected so that if bleeding vessels are seen, the guide carrying the single cold wire coagulating electrode is introduced into the sheath of the resectoscope. The end of the electrode is touched directly to the vessel opening and a moderate amount of coagulation produced until the bleeding is completely stopped.

The median portion of the prostate should be attacked first, because the greatest amount of relief occurs when tissue from this area is removed.

The surgeon should devote more attention to the removal of portions of the prostate along the floor and inferior lateral walls of the bladder and urethra than he should to the large bilateral lobes which may protrude superiorly. One is much surprised, however, after doing a complete "funneling" to find that the patient still has retention. In a few instances I found that this was produced by overhanging flaps of the superior portion of the gland. Subsequently these flaps had to be resected.

When it becomes necessary to resect the bilateral lobes, this should be started from the bladder part of the protruding prostate and should be continued until one has a through and through passage from the verumontanum to the bladder without obstructions from lobes of the prostate. If the first cores of tissue are not removed from that portion of the bilateral lobes which protrude into the bladder or from the bladder end of the urethral enlargements, resection of this portion of the prostate may be troublesome. It is very difficult to engage portions of the lateral lobes in the fenestrum of the direct vision instrument if the bladder portions are not resected first. The direct vision instrument must be manipulated laterally to engage portions of the lateral lobes. This manipulation may be difficult for the beginner and requires much experience and persistence before the urologist can master this part of the resection technic. The resection should never be continued forward far enough to involve the verumontanum.

Following the removal of sufficient tissue the entire operated area is thoroughly inspected at least three times with the coagulating electrode in place ready for use. Every spurting vessel is coagulated so that no bleeding occurs. Too much coagulation should be avoided as these areas harbor infection. After the resection is completed, the irrigating fluid from the bladder should contain no more blood than to tinge it a slight pink, coming from the raw areas which have just been cut and from slight oozing.

Postoperative Care

I emphasize the care with which bleeding should be controlled because this is one of the most discouraging postoperative complications that may occur. After inspection shows that the bleeding has been thoroughly controlled, and that no clots can be found in the bladder, a catheter is introduced and continuous irrigation started. Although we do not use this method routinely, in a few instances we have been able to control the bleeding sufficiently so that no permanent catheter was put through the urethra following the completion of the resection. This drainage catheter need not be a large one. We frequently use catheters of 18 to 20 French and never larger than 24 to 26 French. If the bleeding has been thoroughly controlled, it is unnecessary to introduce a larger one. We insist that catheters have multiple eyes, one on the end and several on the sides, as these permit easy irrigation and the sucking out of clots if bleeding occurs.

If the first inspection after the patient returns to bed shows that no bleeding has occurred, irrigations are done every half hour. Syringes of one ounce capacity are used. These must have a catheter point and well fitting plungers so that suction may be made. A cold antiseptic solution, of either oxycyanide 1 to 10,000 or metaphen 1 to 15,000 dilution, is used for irrigation. If the catheter becomes obstructed, the nurse introduces one-half to one ounce of the cold antiseptic solution and then slowly removes it by suction. This will indicate whether the catheter is open or not, and will remove any clots that may be in the eye or the shaft. When clots are found, irrigation is done every two or three minutes, a small amount of antiseptic solution being gently forced into the bladder and allowed to run back through the catheter. If the solution does not come back promptly, because of clots or bleeding, the irrigation is done continuously. After three hours if bleeding is only slight, continuous irrigation is stopped. At the end of twenty-four hours irrigations should be done twice a day only. At the end of forty-eight hours, the catheter is removed, when I am very careful not only to irrigate the bladder, but the urethra as well. This may be done as the catheter is being removed. Irrigation of the urethra may prevent hematogenous infection, which occurs following the urethral trauma incident to the removal of the catheter. The consequent fever with chills and the discouraging time that both the patient and the surgeon may experience, may be obviated if traumatic lesions of the urethra and subsequent bacteremia may be prevented. Following the removal of the catheter, the bladder and urethra are washed every day, using gentle pressure with a syringe and without a catheter. The patient is given Sitz baths and the routine method of controlling urinary infection as described under preoperative measures. After the patient has been in the hospital one week and is able to empty his bladder in a normal manner, he is allowed to return home, but is instructed to report every day during the next week when his bladder and urethra are irrigated. If no residual urine is present this should be done without a catheter.

The patient's future convalescence is planned according to the findings during the second week of his treatment. If there is pus in the urine or dribbling, or if residual urine is still present, daily irrigations of the bladder and urethra are continued.

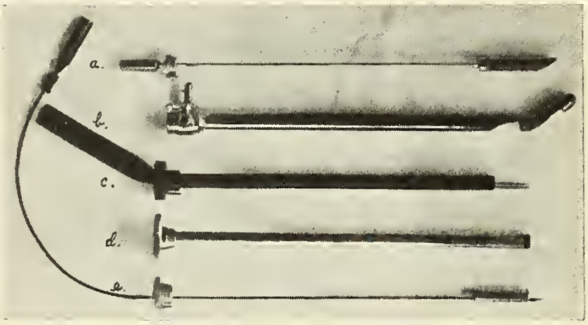


Fig. 5. The direct vision instrument designed by Braasch and Bumpus from above downward:

a. The obturator.
b. The sheath of the instrument with the obturator removed so that the window into which the portions of the prostate protrude may be seen.
c. Pre-resection electrode.
d. Circular knife for cutting which is not activated by an electrical current and is used cold.
e. Post-resection electrode used for coagulating small blood vessels.

This postoperative care of the patient who has had a prostatic resection is more exacting, requires more time and more trained assistants and nurses than the treatment necessary following suprapubic prostatectomy. Few hospitals have ready at hand, on every floor or in every ward, all the necessary equipment that may be required to give prompt treatment. This frequent lack of ready equipment caused me to build and equip a cart which is a complete urological treatment room on wheels which may be used at any time and at any place. This completely equipped cart, plus the assistance of a few well-trained assistants or nurses, has reduced our postoperative complications to a minimum and has reduced the time necessary for the patient's daily treatment.

The average amount of tissue that we have removed at one operation is 10 to 12 grams. In a few instances we have removed as much as 40 grams. The cores of tissue removed are always inspected microscopically.

The technic of prostatic resection will vary somewhat, depending upon the instrument used and the surgeon who uses it. No physician or surgeon should attempt to become a resectionist subsequent to the purchase of one or more of the instruments and appliances now on sale. He must have had special training, so that he possesses:

1. An intimate knowledge of all available types of instruments for resection.
2. A thorough training in the use of one or more of these instruments and sufficient general surgical experience so that enucleation of the prostate, suprapubic cystotomy or any other surgical operation associated with this condition may be done promptly when indicated.
3. A clear understanding of the principles involved in prostatic resection.
4. An understanding of where in the urethra or bladder-neck prostatic resection should begin and how far it should be continued, and why.
5. An appreciation that prostatic resection is a major surgical job requiring more exacting pre-operative, operative and post-operative technic than suprapubic surgical enucleation.

I have adopted a few unchangeable rules concerning the technic of prostatic resection, which are:

1. The careful selection of patients. All prostatic obstructions may not need operation and many may not be resectable.
2. Preoperative treatment which must include suprapubic cystotomy in many cases and partial vasectomy in the large majority.
3. The selection of an anesthetic to fit the operation and the physical condition of the patient.
4. The association of thoroughly trained assistants and special instruments and appliances that are always available, so that prompt postoperative care may be had at any time.

Conclusion

My experience teaches me that, even when a careful technic is followed and when cases are selected, this method of resection offers the prostatic no better ultimate prognosis than he had with prostatectomy done by competent surgeons.

However, many more patients may be safely operated upon and their time in the hospital and convalescence following operation may be greatly reduced.

TRANSURETHRAL PROSTATIC RESECTION*

A Review of 721 Cases in Which the Operation Was Performed During 1932 and 1933

GERSHOM J. THOMPSON, M.D. and WILLIAM F. BRAASCH, M.D.

Rochester, Minnesota

TRANSURETHRAL resection of tissue causing obstruction to urination has proved a blessing to many men formerly denied restoration of vesical function. In recent years this operation has been applied in many cases in which patients for ten years or more had been using a catheter or depending on a suprapubic stoma to drain their urine. In fact, early in the period of the recently revived interest in transurethral surgery, its merit was determined by taxing it with patients who were not fit subjects for prostatectomy. Surviving such a severe test, with a demonstrated mortality rate much less than that following total enucleation of the prostate gland by any method, the procedure has enjoyed a healthy growth and has been extended to include good as well as poor risks. In addition to the fact that it has been applied in practically all cases in which patients formerly would have been subjected to prostatectomy, another group of patients, namely, those with beginning, although definite, obstructive symptoms and a small amount of residual urine, have readily accepted this form of operation, and they have been spared the many months or years of suffering which they formerly would have endured rather than face the risk of relief by prostatectomy. A third group of patients to whom the transurethral operation has universally been acceptable consists of physicians afflicted with prostatic obstruction. As a medical endorsement of the method, we might add that for several years all physicians who were to be operated on for obstructive lesions of the prostate gland at The Mayo Clinic have requested transurethral surgery for the relief of their symptoms.

---

*From the Section of Urology, The Mayo Clinic, Rochester, Minnesota. Read before the meeting of the Minnesota State Medical Society, Duluth, Minnesota, July 16, 17 and 18, 1934.

In the years of 1932 and 1933, 721 patients underwent transurethral resection and forty-six, prostatectomy. The large majority of the patients who underwent prostatectomy were operated on early in 1932, since, in 1933, only seven patients were subjected to total enucleation of the gland. It is the present feeling that only those patients require prostatectomy who have enlargement of the prostate gland or who have deformity of the urethra sufficient to prevent passage of a resectoscope; these are indeed rare cases, especially when the attempt at instrumentation is made with the relaxation of the perineal muscles and prostatic urethra that accompanies anesthesia.

This selection of cases for prostatectomy, namely, those in which a resectoscope cannot be passed, seems to be the only restriction in the application of transurethral resection by a surgeon well-versed in the method. In his early experience, however, a surgeon will do well to choose his cases for resection and restrict his efforts with the resectoscope to patients with moderate enlargement of the prostate gland, relying principally on prostatectomy until he is thoroughly familiar with the pathologic anatomy of the prostatic urethra as viewed through the endoscope. The physician not skilled with a cystoscope of a type that accurately reveals the contour of the urethra will encounter nothing but grief and tragedy when he tries to better the results he could obtain through prostatectomy by turning to transurethral surgery. This has fully been demonstrated in the past few years.

These 721 patients who submitted themselves to resection during 1932 and 1933 complained of the usual symptoms of obstruction and of dysuria; 23 per cent had suffered less than a year, 33 per cent for periods varying from one to three years, and 44 per cent for from three to twenty years or more. Only 3.6 per cent were less than fifty years of age; 21.2 per cent of the patients were from fifty to fifty-nine years of age, 64 per cent were from sixty-one to seventy-four years of age, and 11.2 per cent were from seventy-five to ninety-five years of age. Thus it can be seen that this was a representative group of patients.

Thorough physical examination, in addition to the usual urologic study, is essential. Roentgenograms of the thorax and of the abdomen, and of the various intra-abdominal viscera in some cases, as well as the usual laboratory tests, are indicated if one wishes to anticipate complications before they arise or to complete the medical or surgical treatment definitely required in any given case. Diseases associated with prostatic obstruction in this group of 721 patients were divided into three classes: cardiovascular disease, carcinoma and miscellaneous diseases.

The number of cases in which the various cardiovascular diseases occurred were as follows: angina pectoris, twelve; bundle-branch block, complete, three; bundle-branch block, incomplete, ten; coronary sclerosis, twenty-one; aortic sclerosis, forty-seven, myocarditis with decompensation, twelve; valvular stenosis, four; arteriosclerosis, grades 2, 3, and 4, 120; residual hemiplegia, two; and hypertension with blood pressure more than 150 systolic and 90 diastolic, 216.

The situation of the carcinoma, and the number of cases in which the carcinoma was in each situation were as follows: rectosigmoid or colon, six; stomach, four; bladder, four; lip and face, three; and penis, thyroid gland, and larynx, one case each.

Miscellaneous diseases, and the number of cases of each were as follows: diabetes mellitus, thirty; syphilis, eighteen; duodenal ulcer, thirteen; disease of liver and gallbladder, eleven; goiter, seven; Parkinson's syndrome, four; pituitary tumor, one; gout, five; and severe pulmonary disease, sixteen.

Next in importance is thorough study of renal function. Tests of retention of nitrogen probably are most valuable; excretion tests, such as the phenolsulphonephthalein test, are, however, useful in estimating the degree of existing hydronephrosis or of hydroureter. Likewise, in selected cases, an intravenous urogram serves as an excellent excretory test of function and, in addition, delineates any deformity that exists in the upper portion of the urinary tract. In fifteen cases in this group, one kidney was found to be completely functionless at the conclusion of the preoperative period of preparation. In only one case was nephrectomy necessary during convalescence from prostatic resection. Various other tests of renal function, such as urea or sulphate clearance, retention of creatinine, or determination of serum sulphates, were made in selected cases. The amounts of urea retained in the blood at the time of admission and twenty-four hours before operation are given in Table I.

TABLE I. UREA RETAINED IN BLOOD

On admission, mg. per 100 c.c. of blood	Cases, per cent	Day before operation, mg. per 100 c.c. of blood	Cases, per cent
Up to 40	71	Up to 40	85
41 to 100	24	41 to 70	14
101 to 200	4	71 to 100	1
200 or more	1	Over 101	

A variety of opinions has been expressed as to the value of an inlying catheter as a means of draining the bladder prior to operation on the prostate gland. Some have said that it is always indicated because it reduces infection in cases in which cystitis is present, and leads to cystitis and consequently to vaccination against subsequent severe infection in cases in which urine is sterile on admission. These arguments seem inconsistent. Others have stated that the amount of residual urine should be the determining factor in deciding whether such a measure should be instituted; this also seems illogical. It is our belief that the degree of impairment of renal function is a factor of primary importance. The amount of residual urine, the degree of pyuria, or the size of the prostate gland all are factors of secondary importance. One should not, of course, operate on a patient with a high fever, or on one whose extremely purulent urine drains from a vesical diverticulum through a narrow diverticular orifice. We are firmly convinced, however, that a prolonged period of drainage by means of a catheter, in the hope that pyuria will be greatly diminished or that a large gland will shrink to a small fraction of its former size, will lead to more disaster than complete avoidance of such preoperative treatment. Of the 721 patients, 28.1 per cent were unable to void on admission to the clinic, and practically all of this number had been using a catheter, although in some instances suprapubic drainage had been established elsewhere; 47.1 per cent were able to void but had residual urine varying from 60 c.c. to 4,000 c.c., and symptoms were deemed sufficient for operation, especially in view of a history of a greater retention, among 23.9 per cent of the patients who, on examination, had 60 c.c. or less of residual urine after voiding.

The bladders of 399 patients (55 per cent) were not drained before operation, with the exception of a single catheterization to estimate the amount of residual urine, transurethral resection being performed immediately after completion of examination. Drainage for a period of from several days to several months, before transurethral operation, was employed in other cases, and the following methods were used: intermittent drainage by catheter in twenty-six cases (4 per cent); permanent drainage by urethral catheter in 208 cases (29 per cent), and cystostomy performed at the clinic or elsewhere in eighty-eight cases (12 per cent). Cystostomy, as a preliminary method of drainage, was established in conjunction with a diverticulectomy, resection of vesical tumors or with removal of large vesical calculi in many of the eighty-eight cases so listed.

Anesthesia induced by injecting procaine into the spinal fluid has been found superior to all other forms of anesthesia and it was used in 89 per cent of the cases in this series. One should never use more than 100 mg. of the drug, and often as little as 50 mg. will suffice, particularly for men who are more than seventy-five years of age because they seem to metabolize procaine very slowly. In the remaining 11 per cent of cases general anesthesia was employed. One might question the duration of spinal anesthesia produced by procaine, particularly in the smaller doses. We found, however, that supplemental anesthesia rarely was necessary, since 80 per cent of the operations were completed in less than an hour.

The various types of prostatic obstruction, and the number of cases of each type were as follows: contracted vesical neck, sixty-three (9 per cent); hypertrophy of median lobe (entirely or predominantly), 179 (25 per cent); hypertrophy of lateral lobes (entirely or predominantly), 163 (23 per cent); tri-lobar hypertrophy, 214 (30 per cent), and carcinoma, ninety-five (13 per cent).

Thorough study of the vesical neck with a retrograde-lens cystoscope is desirable in mapping out the course of operation. With such an instrument the portion of the gland which protrudes into the bladder is readily visualized, and nodules, which often herniate through the internal sphincter in very bizzare fashion, are revealed. Tags and portions of tissue are formed which, if not removed, are potential sources of annoyance postoperatively since they cause a valve-like flap at the internal urethral orifice which seriously impedes urination. Complete removal of all tissue projecting into the bladder, and of any nodules which fold into the vesical neck, is most essential. A free channel through the prostatic urethra is desirable, although this is not so important as is a wide-open funnel at the internal urethral orifice. Transurethral prostatic resection is not a "channeling" operation. It is not sufficient to cut a groove through a large, median lobe. Such operations result in convalescence prolonged by repeated bleeding from sloughing areas in the portion of the prostate gland that is caught in the partially opened vesical neck. Tenesmus, dysuria, fever and chills, and early recurrence of obstruction are the inevitable consequences of such incomplete operations, bringing discredit to a procedure which, if skillfully done, cannot be equalled in the quick, certain, complete relief it affords the patient.

The removal of tissue must be kept well within the external sphincter; it is in only an exceptional case that one should resect even within several centimeters of this muscle. Hence, the percentage of cases of incontinence should be very low, if indeed this condition need occur at all. Sufficient tissue should be excised to enlarge the vesical neck considerably. At times removal of the entire subcervical lobe, of a huge, intravesical, projecting, comissural portion, or of large obstructing portions of large lateral lobes will tax the patience and ingenuity of the surgeon.

In 9.8 per cent of these 721 cases it was necessary to remove more than 25 gm. of tissue to relieve the obstruction; in 35.5 per cent between 10 and 25 gm. of tissue were removed, in 28.7 per cent between 5 and 10 gm. of tissue were removed, and, in 26 per cent, the removal of less than 5 gm. of tissue sufficed to eliminate residual urine. In one case 116 gm. of tissue were removed (Fig. 1). There is little question that such thorough removal of tissue will obviate future obstruction.

Postoperative care should include measures to avoid prolonged hemorrhage. It has not been found necessary at the clinic to use prostatic bags, and frequent lavage with boric acid solution through an inlying catheter has been depended on to minimize formation of clots. Drainage by catheter of forty-eight hours' duration usually is sufficient. Following removal of the catheter, one should watch for evidence of continued urinary difficulty and catheterize the patient again in six hours or less to determine whether or not he is voiding completely. In 13.6 per cent of cases, secondary resections were found necessary to enable the patient to void a large, unobstructed stream of urine. Many of these patients might have been persuaded to be content with a small intermittent stream, and thus have avoided this repetition of the operation, although the functional result would have been inferior and the chance of early recurrence possibly greater. The secondary operation as a rule results in even less discomfort and reaction than the primary one, and the possibility of delayed hemorrhage, pyelonephritis, and of fever of urethral origin is minimized by not forcing the patient to get along with a poorly functioning vesical neck partly obstructed by edematous, adenomatous tissue. Some investigators claim such tissue eventually will be absorbed or shrink if left alone. If the patient is completely emptying his bladder, determined by catheterization on successive days, he will not require further postoperative treatment other than continued observation to obviate the danger of delayed bleeding. In the average case healing will be complete in approximately three weeks. If severe hemorrhage should supervene during this period,

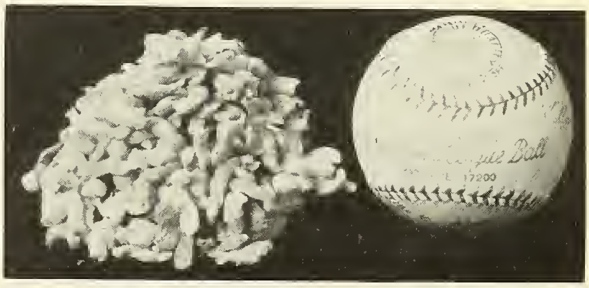


Fig. 1. Tissue weighing 116 gm. removed from a prostate gland. The baseball is 9 inches (22.5 cm.) in circumference.

aspiration of the clots through a cystoscope and electrocoagulation of bleeding points is always possible. Cystostomy to control such hemorrhage was not required in any case in this series.

The period of hospitalization is given in table 2. During this time, with the exception of the day of operation, most of the patients are ambulatory.

TABLE II. POSTOPERATIVE DAYS IN HOSPITAL

Days in hospital	Cases	Per cent
1 to 7	357	49
8 to 14	229	32
15 to 21	78	11
22 to 28	35	5
29 or more	22	3
Total	721	100

The mortality rate in this series of 721 cases was approximately 0.7 per cent; five patients, between sixty-six and eighty-five years of age, died from fourteen to thirty-two days postoperatively. Two of these deaths were from bronchopneumonia, one from pyelonephritis, one from septicemia, and one from pulmonary embolism. Since the time the last patient died following operation, a consecutive series of more than 350 patients has been operated on without a death.

Up to January 1, 1934, twenty-six patients had returned for prostatic resection following resection or punch operation done during the interval from January 1, 1913, to January 1, 1933. Resection was performed for 655 patients in this period. Eight of these twenty-six patients had a malignant condition in the gland at the time of primary operation; recurrence, therefore, might well be expected. Four of the remaining eighteen patients suffered initially from a contracted vesical neck, whereas six had only a small median bar. This leaves only eight cases in which there was definite adenofibromatous prostatic hypertrophy of the type formerly removed by prostatectomy. It is well known that patients with a small median bar or with a contracted vesical neck often persist in having recurrent obstructive symptoms no matter what surgical procedure is employed. However, if only the cases in which a malignant condition was present are excluded, the recurrence amounts to 2.7 per cent. In arriving at this figure the 451 cases of 1933 are not included, although any recurrence encountered during that year has been included. It is also interesting to note that, included in the series of 721 cases reported, are twenty cases in which patients underwent transurethral resection for recurrent obstruction after prostatectomy performed at the clinic or elsewhere. There seems to be little difference, therefore, in the percentage of recurrence after either prostatic resection or prostatectomy. Since more patients will survive resection than will survive prostatectomy, there may be a slightly greater incidence of recurrence over a period of years.

Conclusions

1. Transurethral prostatic resection is applicable in practically all cases of obstruction of the vesical neck which require operation.

2. Thorough physical examination and laboratory study are necessary if complications are to be anticipated and avoided.

3. Preoperative drainage by inlying catheter should be instituted only in cases in which renal function is definitely impaired. It is a mistake to employ such drainage in an attempt to reduce infection either in the prostate gland or in the bladder, or in an attempt to reduce the size of the prostate gland.

4. Resection should be thorough; most of the obstructing tissue will be found in the vesical neck.

5. Early reoperation is indicated in cases in which a poor functional result follows primary resection.

6. A mortality rate of less than 1 per cent can be expected.

7. Recurrence will probably be in inverse proportion to the thoroughness of resection. It should be little if any greater than that which follows prostatecomy.

THE PALLIATIVE TREATMENT OF TIC DOULOUREUX*

E. J. ENGBERG, M. D.

Saint Paul

THIS presentation will be devoted entirely to the subject of tic douloureux and the palliative treatment thereof by alcoholic injections. This condition is one entirely distinct from all other forms of facial pain. It is a clinical entity, the cause of which is unknown, with paroxysms of severe unilateral pain of a cutting, piercing character through some part of the distribution of the trigeminal nerve. The pain usually can be precipitated by stimulating the area of the nerve distribution of the division affected. This may be by touching the skin, by a cold breeze striking the affected side of the face, and often by talking, chewing or swallowing. If swallowing precipitates pain, glossopharyngeal neuralgia must be differentiated. Between paroxysms no pain is present. Examination reveals no neurological changes in the area supplied by the nerve affected except when the so-called "trigger-zones" above described are present. It is particularly important that the fact that tic douloureux is a distinct entity be borne in mind constantly when treatment of facial pain is considered, for any form of treatment that breaks the conduction of nerve impulses in the trigeminal nerve at any point between its entrance into the pons and the affected nerve endings will relieve the pain. Such form of treatment, however, will be ineffective in other forms of facial pain and usually will aggravate the symptoms of the patient. This interruption of the impulses in the fifth cranial nerve may be accomplished by: (1) resection of the terminal branches if the condition is limited to these; (2) the injection of the affected nerve with substances which temporarily destroy its function, as, for instance, alcohol, which is generally used; or (3) radical operation.

We rarely see patients now who have had a recent nerve resection for the relief of this condition, as alcohol injections have largely replaced this operation.

I desire to present briefly a case history which illustrates the characteristics of tic douloureux.

Case 1.—Mrs. I. H. Age twenty-four. Referred by Dr. A. J. Hammond, Minneapolis. The patient was seen by Dr. Ball first on November 10, 1924. Pain had begun about a year before in the right third division. It had been thought at that time that it was probably due to the right lower first molar but removal of this tooth made no difference in the pain. At first pain came in intervals, sometimes with a week's freedom, sometimes a month's, but became progressively more severe until in July of 1923 she had been injected elsewhere. This completely stopped the pain until it had recurred mildly about two weeks before her visit. She had never had pain in the first or second divisions. The third division was successfully injected November 10, 1924, by Dr. Ball, with complete relief. On October 1, 1925, the third division was again injected by Dr. Ball as pain had recurred a short time previously. The patient reported next on July 29, 1929. A short time before she had developed moderate pain in the right lower teeth and gums. Eating or talking would precipitate pain, as would placing her tongue against the teeth of the right lower jaw. The right third division was reinjected by Dr. Ball that day. On April 9, 1933, the patient was seen by the writer. Severe tic pains had recurred two days previously with the trigger area now changed from the right third to the second division, as touching the face in the region of the right lower lid would start pain. It was thought probable that a trigger zone was present in the first division also as the patient had observed that scalp treatments of late had been somewhat uncomfortable and in the past two days pain had come occasionally when touching the right upper eyelid. Many paroxysms of tic occurred spontaneously, however, so there was uncertainty as to how many divisions were involved. The right second division was injected satisfactorily. Two days later the patient returned and was very much better but said she had had one severe tic pain through the supraorbital and infraorbital region, but no trigger zone could be found. A supraorbital injection, however, resulted in complete relief for the patient. On February 22, 1934, she returned requesting that the deep alcoholic injection be repeated as she had had recurrence of the tic pains two days previously. These were coming several times a day and were very severe, with a trigger area in the distribution of the right supraorbital branch and also the right second division. We advised the patient that she should not continue with alcoholic injections and referred her to Dr. A. W. Adson for radical operation. In his absence she was operated upon by Dr. W. McK. Craig, who on February 26 divided the posterior root of the right gasserian ganglion. Upon returning home she reported that she was completely satisfied with the result of her operation.

---

*Presented before the Minnesota Society of Neurology and Psychiatry in connection with the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

The above case shows the following characteristics of this condition:

1. Paroxysms of severe pain with intervening intervals of complete freedom of symptoms lasting from a few moments to several hours.
2. "Trigger areas" or as sometimes called, "dolorogenetic zones" which precipitate paroxysms of pain when stimulated.
3. Periods of relief following deep alcoholic injection with later recurrences.
4. Relief following a proper radical operation, which is permanent.

However, cases are seen of so-called atypical tic douloureux and these always present a problem both in diagnosis and in treatment. The first case of this type (Case 2) that we desire to report is one with a true tic douloureux, apparently, in whom, for some unknown reason, pain was replaced by paresthesias in the distribution of the nerves injected even though good objective analgesia resulted. On his own initiative, he then decided to have the radical operation and selected a highly competent neurological surgeon to perform it. The surgeon who operated upon him later informed the writer that he would not have performed the radical operation had he not been misled by the patient's statement that he had been relieved following some of his deep alcoholic injections.

Case 2.—Mr. M. W. G. Age sixty. Referred by Dr. Alfred Hoff, Saint Paul, Minn. The patient had had pain in the right side of the face for a year. This was first thought due to an infected lower tooth, which was extracted. The pain then was transferred to the next tooth and so on until he had four lower teeth removed without relief. Touching the right lower lip or right lower second incisor, eating, spitting or talking would bring on a paroxysm of pain. These had become so frequent and so severe the previous week that he had scarcely been able to eat or to talk at all. He had a definite "trigger" in the upper right cuspid and another in the outer border of the right lower lip. The writer saw the patient in the temporary absence of Dr. Ball on January 17, 1925, and attempted to inject the right third division but was unsuccessful although the needle was introduced as far as 5 cm. The right second division, however, was successfully injected the same day. The patient was seen five days later and still had pains in the distribution of the right second division, which he said returned almost immediately after the injection and had been as severe as before. The right second division was reinjected that day. He was seen next on February 9. He then complained bitterly of paresthesias of the cheek bone of the right side consisting of disturbances of sensation which he described as burning, crawling feelings. The injections were interrupted and the patient was placed upon a sedative. He was seen several times from then until April 7, when Dr. Ball returned and was asked to see him. He had no tic pains but was still very uncomfortable because of the sensations described, but these now were most noticeable, he said, in his right eye. He also complained of feeling very nervous. In view of the good analgesia still present in the right second division, no successful injection of the third and a history of a mild trigger zone in the right lower lip, Dr. Ball suggested a deep injection of the third division. The writer on the following day successfully made the injection, striking the nerve at 4.5 cm., but the patient was unrelieved. On the eleventh, Dr. Ball injected the third division, making a good injection, but the pain was unchanged. On the fifteenth he injected the second division and repeated it on the twentieth, which was the last time we saw the patient. On December 27, 1925, we had a letter from him stating that after our last treatment he had the radical operation performed and wrote, "I have worked only six days since February. I think I can say with the melancholy Dane that 'It were better to bear the evils we have than to fly to others we know not of,' and wish I had borne my ills rather than to try to remedy them with the present result."

Case 3.—Mrs. S. W. Age forty-one. Referred by Dr. R. C. Radabaugh, Hastings, Minn. Eight months before on two successive days the patient had had paroxysms of severe pain through the right side of her cheek running into the forehead and eye of that side. Blowing her nose would precipitate a paroxysm of pain. This had recurred and been present for about a month when first seen by the writer on January 23, 1932. Touching the inside of the right naris, eating or talking started pain typically tic-like. She said it felt as though she had some sharp object stuck in her right nostril. When pain was severe, her right eye watered. Her nose and throat had been checked by a very competent specialist during that week with negative findings and he had cocainized the sphenopalatine ganglion without relief. Dr. Radabaugh was informed that the case was atypical but in all probability would prove to be tic douloureux but we recommended that injections be deferred. The patient continued to have symptoms at varying intervals and on February 7, 1932, the writer made a successful deep alcoholic injection of the right second division. After this it was not possible to start pain by touching the former trigger zone inside the right nostril. On April 9 a letter was received stating that she has "bad pains in the *back of the head* and face is quite sore" and asked for something to relieve the pain. She was referred back to her physician, who was advised to place her on a sedative. On December 15, 1932, the patient returned, stating that she had developed tic pains in the former location associated with a constant pain in the back of her head on the right side, which she described as feeling as though her head were being bolted together, and this feeling was so severe that she could not lie down at night. The writer successfully reinjected the right second division. On June 18 of this year the patient reports: "My facial nerve condition is pretty fair now but last year, August, 1933, I took chiropractic treatments and got very good results. Since then I have been feeling pretty good, no pain in the face, but *my head is painful* at times."

It will be observed that the writer's original impression was that this was a doubtful case of tic douloureux and this opinion is unchanged. This patient is the type of case that should be carefully studied before radical operation is recommended and it would be much wiser, if severe tic-like pains recur, to resume the deep alcoholic injections, at least until the diagnosis is clear.

The following is an atypical case in which either deep alcoholic injections or radical operation is clearly contra-indicated.

Case 4. Miss R. Y. Age twenty-nine. This patient reported to the writer on January 19, 1934, for deep alcoholic injection. She stated that for the past seven years she had had a pain in the left lower jaw for which various things had been done without relief. Careful inquiry revealed that the pain ran mainly through the left lower jaw but sometimes ran well over into the right lower jaw and sometimes into the shoulder and neck of the left side. The pain always is worse during cold weather or when she becomes fatigued, but is constantly present to some degree during her waking hours. It does not awaken her, however, though it may interfere with her falling asleep. The patient said she came here because she had "tried everything" to secure relief of this condition and now wondered if deep alcoholic injection might be helpful. Among the things she had had done: Her teeth had been examined very carefully and all suspicious ones extracted; a septum operation had been performed. Following this she spent ten months at home resting but without benefit. She then had her sinuses irrigated several times though no pus ever was found. This surgeon then suggested that she try general massage. She had just completed a long course of these treatments, but had become very nervous and tense and was having more pain than before they were started.

The patient was advised that the condition was not tic douloureux and would not be relieved by deep alcoholic injection. She was placed on a mild sedative and instructed to continue at her work, avoiding undue fatigue and including in her program a reasonable amount of diversion and recreation, which she had largely given up. Her condition is greatly improved and she has continued her work regularly, although she still has her symptoms to some degree.

She stated that more than a year before she had seen Dr. F. P. Moersch, who had told her that he did not believe that it was probable her condition was one that would require surgical treatment, but if the pain continued, she should consult some neurologist again. Dr. Moersch was kind enough to send the following report:

"We were privileged to see Miss R. Y. in August of 1932. Her general physical examination, including routine laboratory tests and x-ray of sinuses, proved to be entirely negative throughout. Because of the pain in the face she was sent to our department for opinion. She stated at that time that about six years previously she had the onset of a steady, dull ache in the left upper jaw. This came on about a year and half after the mumps and while she was having some dental work done. Since the onset she told us that the pain had never let up and that she felt that it was steadily growing worse. For about six months prior to her visit here she felt that the pain was interfering with her sleep. She also told us that the trouble was worse in cold or damp weather but the pain had been more severe than ever during the months preceding her visit here. The neurological examination proved to be entirely negative throughout. We felt at the time that there was no indication for any surgical treatment and advised Miss Y. to return to work and try and get along with as little medication as possible and that if her condition became too trying she should place herself under the observation of a neurologist. From our record it appears that she belongs in the group of chronic persistent facial pains that are always so difficult to remedy."

The technic we follow in alcoholic injections for tic douloureux is that which, with certain modifications, our late associate, Dr. C. R. Ball, began to employ in 1908[1] after he had heard Dr. Hugh Patrick report fifteen cases successfully treated by him in this way. The first case in which Dr. Ball employed it involved the third division of the fifth nerve. The directions given by Dr. Patrick for the injection of the second and third divisions as they emerge from their respective foramina in the skull were followed, as is still our custom. To make the deep injection we use a special 20-gauge steel needle made for this purpose, 6 cm. in length and having a sliding device which may be set to prevent danger of introducing the needle to an excessive depth. In the first case treated by Dr. Ball, 75 per cent alcohol was used. Later the special solution of alcohol and cocaine recommended by Dr. Patrick[2] was adopted:

Cocaine Muriat	0.1
Alcohol	13.5
Aq. Dest. q.s. ad	15.5

Subsequently the following modification was adopted:

Cocaine Muriat	0.195
Distilled Water	4.0
Alcohol 95 per cent q.s.	90.0

Ordinarily from 1 c.c. to 2 c.c. are given in a deep alcohol injection. In the superficial injection, not over 0.5 c.c. is injected where the branch, such as the supraorbital, makes its exit from the skull. Sometimes in debilitated cases we omit the cocaine but then the local pain following seems intensified.

The nurse prepares the affected side by wiping it carefully with alcohol. The injections are ordinarily made using no anesthetic except to infiltrate with novocaine the site for injection after Tr. iodine has been applied to this area. We feel that it is desirable that the patient be conscious because his coöperation in indicating whether pain is felt down the course of the nerve is helpful in locating it and, furthermore, successful injection has occurred only when analgesia results in the distribution of the nerve injected. The determination of this requires a conscious patient as it is indicated by loss of pain to pin prick and this test should be made before treatment is completed.

Our deep injections include the second and third divisions only, as too great danger is attendant upon attempting to inject the first. Frequently the supraorbital branch of this division is injected, however. If the dolorogenetic area is in the first division and outside of this branch, radical operation only will afford relief. It is rare that we make any injections of the superficial branches of the second or third divisions. In cases where an injection of the mandibular branch only is indicated, we refer the patient to a dentist experienced in this particular field.

In all cases, after thorough routine physical examination has been done, a careful neurological examination is made to rule out any organic lesion that might cause pain in the area of the trigeminal nerve. The patient is advised to have infection of sinuses or teeth eliminated. If the pain is mild and especially so if atypical, alcohol injections are deferred until the infection has been removed and the effect observed, but if the symptoms of tic douloureux are distinct, the deep alcoholic injections are completed first.

Of the cases of tic douloureux treated with deep alcohol injections since 1910, there are 171 whose records are sufficiently complete to serve the purpose of an analysis of the results of this form of treatment. Of these, 100 were females and seventy-one males. In analyzing 148 histories where data as to age were available to determine when the onset of symptoms occurred, this was found to be fifty-eight years both for females (90) and males (58). The youngest patient was nineteen and the oldest was eighty-nine when first injected. The shortest time injection was made after initial pain had occurred in the first attack was ten days and the longest time was twenty-six years. The average length of time before injection was made was sixty-eight months in fifty-five males and seventy-seven months in seventy females.

The histories of 141 indicate clearly the divisions involved at the time of the first visit, which were as follows:

Right first division	1
Right second division	23
Right third division	35
Right first and second divisions	4
Right second and third divisions	27
Right first, second and third divisions	3
	93
Left first division	2
Left second division	12
Left third division	13
Left first and second divisions	1
Left first and third divisions	1
Left second and third divisions	18
Left first, second and third divisions	1
	48

In many instances other divisions of the same side became involved later. In four of our total series of cases, later involvement of the opposite side was reported. In one of these the involvement was so mild that thus far he has not required active treatment but three patients had severe involvement, two of them being treated by deep alcohol injections by the writer and one reports being relieved elsewhere by mandibular block with alcohol.

A follow-up was undertaken in June, 1934, of the 171 patients treated by this method since 1910 when we began to keep our records. To eight no questionnaires were sent because of incomplete addresses. Forty-six did not reply, thirty were returned unclaimed and it is fair to assume that of these seventy-six, practically all are deceased in view of their age when seen and the length of time elapsed. In addition to these seventy-six, there are thirty-two reported deceased with no statement of condition subsequent to our last treatment. Of the remaining fifty-five whose subsequent condition could be determined, five were reported deceased, four having been comfortable since our last injection was given until death and one having had deep alcoholic injections elsewhere with relief. Twelve had had radical operations, five of these without further intervening alcohol injections. Of the twelve operated, three had died immediately following it. Two of these were operated by recognized neuro-surgeons but one of these patients, seventy-three year of age, was recognized as a very poor surgical risk. Of the nine surviving the operation, eight have had permanent relief of symptoms and one no relief (case 2 reported herein). Seven of the fifty-five had had subsequent alcohol injections elsewhere, four being relieved and three unrelieved until radical operation was performed. One, aged fifty, reported three years ago for reinjection and was advised to have the radical operation instead. He has secured relief by using inhalations of trichlorethylene only for several subsequent remissions and is free from pain at present. This is the only patient in our series who has been appreciably relieved by this preparation. One has had no recurrence in the side originally involved since his last injection four years ago but reports that the other side became involved a year ago. Thirty-two of the fifty-five report they have had no further treatment since our last injection. Of these, twenty-one are free from symptoms and eleven have occasional mild pains but not sufficiently severe to require injection.

The average period of relief from deep alcoholic injections has been from one to two years. One patient reported that he had a recurrence, however, one month after being successfully injected and then had radical operation with relief. Two did not suffer recurrences until after ten years. One, injected twelve years ago, had no recurrence for seven years and only recently have the attacks become severe. She plans to be reinjected.

Of those now free from pain, one has been so for seven years though her face is sensitive to cold; one has had no treatments for eleven years and reports she is feeling fine but has had a few mild, brief recurrences, the last one a year ago, all disappearing spontaneously. One has had no treatments for nine years but has had a few mild recurrences, the last three years ago, all stopping spontaneously, and one, already mentioned, has had no tic pains on the side injected in 1930 but the other side became involved last year. An alcohol block of the mandibular branch done elsewhere relieved him until recently when mild pain recurred in this branch.

Conclusions

I. Tic douloureux should be recognized as a distinct clinical entity and effective treatment instituted promptly.

II. Injection of the affected divisions or branches with alcohol should be employed:

  A. In recent cases of tic douloureux

    (1) To relieve the symptoms of the condition.

    (2) To verify diagnosis before radical operation.

    (3) To demonstrate to the patient temporarily the numbness which will be permanently present if radical operation is performed.

  B. In recurrent cases of tic douloureux

    (1) If patient's condition is unfavorable for radical operation.

    (2) If radical operation is refused.

III. The recurrent case should be urged to have the radical operation while still a good surgical risk in view of the limitations of palliative treatment.

References

1. Ball, Charles R.: Treatment of tic douloureux by injection of alcohol. St. Paul Med. Jour., 10:347, (June) 1908.

2. Patrick, Hugh T.: The technic and results of deep injections of alcohol for trifacial neuralgia. Jour. Am. Med. Assn.

MEDICAL ASPECTS OF THE COMMONER INDUSTRIAL POISONINGS*

RAYMOND N. BIETER

Associate Professor of Pharmacology, University of Minnesota

Minneapolis

ALTHOUGH industrial poisonings are as old as civilization, it was only with the advent of the machine age that they gradually became more common and at times alarming. During the past several decades, much illuminating work has been carried out to show prevalent dangers, and satisfactory progress has been made in the prevention and treatment of many forms. However, at the present time, with industry changing rapidly, many dangers are still with us and at times poisonings become quite common. From our standpoint, the most common and dangerous forms are those poisonings produced by arsenic, lead and carbon monoxide.

Arsenic is one of the most dangerous industrial hazards that we have. Its chief sources, from the standpoint of industrial poisonings, are its presence as a contaminating agent in lead and lead alloy products, pigments, coal tar products and commercial acids, and its use in insecticides and rodent poisons such as Paris Green and lead arsenate.

Sollmann in his Manual of Pharmacology gives the toxic dose of arsenic trioxide as 5 to 300 mgm. From the larger of these doses effects may come on in a few hours and result even in death in from a few hours to several weeks. From the smaller dosages, especially if taken repeatedly, the effects tend to come on slowly over a period of days to weeks or months. In this connection it might be well to recall that the U. S. P. dose of arsenic trioxide is 2 mgm.

With these dosages in mind you can all see the dangers associated with the use of arsenic. You can also see that anyone who handles an arsenic-containing substance, or who inhales arsenic-containing dust or whose skin becomes covered with an arsenic-containing dust or spray, is a potential case of arsenic poisoning. This is especially true when it is remembered that arsenic can be absorbed by the human body from the respiratory tract, the gastrointestinal tract and even the intact skin.

The first effects of arsenic upon the human body are, as a rule, local effects, manifested where the substance comes in contact with living tissue. The reaction is similar to a local inflammation, in that there is slow death of the cells, due probably to a combination of the arsenic with the cell proteins. Underneath this region there occurs a capillary dilatation. These effects are seen most frequently on the skin or the mucous membrane of the nose.

Later, after systemic absorption, symptoms of acute poisoning are produced which may be classified as follows:

a. Symptoms of gastroenteritis: dry mouth, thirst, vomiting, abdominal pain with diarrhea, stools which may contain mucous shreds or blood.

b. Symptoms due to effect on circulatory system: dilatation of blood vessels with resulting low blood pressure and feeble or irregular pulse. Cardiac failure may result in collapse and death.

c. Symptoms due to effect on nervous system: Cramps in legs, restlessness, great prostration, convulsions, paralysis. Exhaustion and collapse may produce death. Within a few days, if death does not occur, there is apt to be added to the above, jaundice and albuminuria, due to fatty degeneration of the liver and kidneys produced by the arsenic.

With small but repeated intake and absorption of arsenic, the following symptoms tend to occur, developing slowly: loss of appetite and weight with other symptoms of indigestion, puffy eyelids, sore eyes, increased secretion from nose, throat and larynx, ulceration in the mouth, perforated nasal septum, muscular weakness, dry falling hair, brittle nails and skin eruptions, symptoms produced by fatty degeneration of all organs, especially liver, kidneys and heart muscle and changes in peripheral nerves leading to polyneuritis, muscular atrophy, disturbances of sensation and changes of special senses such as blindness.

---

*From the Department of Pharmacoloy, University of Minnesota Medical School. Read at the Annual meeting of the Minnesota State Medical Association, Duluth, July 18, 1934.

The chief sources of lead poisoning with which we must contend are lead and its alloys, paint, enameling and pottery industries, printing, storage batteries, insecticides such as lead arsenate, and possibly lead-containing motor fuels.

Lead is not so apt to produce an acutely fatal reaction as is arsenic. The body apparently can tolerate more of this metal, for Sollmann gives as the acutely fatal dose, from 10 to 50 gms. of soluble lead salts. However, 1 gm. or less can produce serious poisoning. An absorption of as little as 1 mgm. per day can produce toxic symptoms after several weeks to years. This is due to the fact that cumulation occurs because the average daily excretion amounts to not more than 0.5 mgm. One of the most interesting and important things to remember is that human beings show very marked variations in their susceptibility to this metal, hence possible danger is always present. Lead absorption can occur from any part of the body, with the possible exception of the intact skin. The most rapid absorption has been shown to occur from the respiratory tract due to inhalation of lead-containing dusts and sprays, and fumes from the molten metal.

The symptoms of acute lead poisoning may briefly be grouped as follows:

a. Symptoms of gastroenteritis: sweetish metallic taste, nausea, vomiting, severe colic, alternate diarrhea and constipation.
b. Symptoms due to effect on the circulatory system: constriction of blood vessels with increased blood pressure, skin pallor, slow pulse, basophilic stippling of red blood cells and no leukocytosis.
c. Symptoms due to effect on nervous system: headache, backache, insomnia, general asthenia, acute neuritis, ataxia of hands or feet, optic neuritis, and occasionally encephalopathy.

People who either have superior eliminative powers, or increased tolerance for lead, may not show the above picture. They may, however, after prolonged periods of exposure, show chronic lead poisoning. In these cases, in addition to the above symptoms, there may also be present a lead line on the gums, more marked nervous involvement, and due to the tendency of lead to produce generalized arteriosclerosis, where arsenic produces fatty degeneration, symptoms associated with this pathological process are in evidence.

The diagnosis of arsenic and lead poisoning, especially the chronic forms, is not always easy. As far as the patient's welfare is concerned, it may be said, however, that any one with a history of exposure to either of these metals who complains of indefinite symptoms from the gastrointestinal tract and nervous system should be considered as a case of poisoning until proven otherwise. In many cases an absolute diagnosis cannot be made until the metal in question is isolated chemically from the urine. This can be accomplished in more than half of the cases.

Carbon monoxide is perhaps our third important industrial poison. Its chief sources with which we must be familiar are: the internal combustion engine, welding apparatus, and coal, gas and oil heating appliances. As these mechanical devices are being used more than ever before, the dangers of this poisoning are perhaps greater than ever before.

Carbon monoxide is a colorless, odorless, nonirritant gas. Therefore it gives no warning of its presence. It is present in artificial gas from about 4 to 10 per cent. It is formed by the incomplete combustion of natural gas, oil and coal. It is present in the exhaust gas of an automobile up to 6 per cent.

The affinity of hemoglobin for carbon monoxide is 210 times its affinity of oxygen, so you can easily realize how rapidly it will be taken out of the inspired air. When the hemoglobin is 20 per cent saturated with carbon monoxide, dizziness and increased respiration occur; with 50 per cent saturation, unconsciousness occurs; and with 60 to 80 per cent saturation, death occurs. As little as .05 per cent carbon monoxide in inspired air will give beginning toxicity and may produce hemoglobin saturation of 14 to 27 per cent in from one to five hours. This concentration represents five parts of carbon monoxide in 10,000 parts of air. A concentration of .07 per cent in inspired air will produce severe toxicity and a .2 to .4 per cent concentration will produce death.

Acute carbon monoxide poisoning shows

largely the symptoms of asphyxia, without cyanosis. This lack of cyanosis is due to the fact that carbon monoxide hemoglobin is pink. At first there is a rise of blood pressure, during which apoplexy can occur; later there is low blood pressure, and deep and difficult respiration. There may also be headache, dizziness, loss of memory, anesthesia, loss of spontaneous power of movement, and convulsions, followed by unconsciousness. When death occurs it is due to respiratory paralysis. Recovery may be rapid or the return to consciousness may occur slowly with prolonged headache, weakness, and loss of pain sensation, and muscular paralysis may be present for days. Pulmonary and nervous complications may occur due to fatty degeneration of the parts affected.

Chronic poisoning may occur with 4 per cent blood saturation of carbon monoxide. This amount can accumulate from as little as one part of carbon monoxide in 20,000 parts of inspired air. The symptoms of this form of poisoning are similar to those of the acute form. They develop more slowly and show chiefly altered digestion, weakness, headache, dizziness, loss of memory and slow intellect.

Other essential factors in the diagnosis of carbon monoxide poisoning are to be obtained from the history of exposure to exhaust or burned gases, and from the spectroscopic examination, and qualitative tests of the blood for carbon monoxide-hemoglobin. One of the latter would be to dilute some blood with water, then later add a small amount of alkali. Under these conditions normal hemoglobin soon changes to brown and green, whereas carbon monoxide-hemoglobin remains pink.

In conclusion, I wish to emphasize that though these poisonings are old and world-wide we should none the less not lose sight of them. We ordinarily think of these poisonings on the one hand as belonging to large industrial centers. Yet, on the other hand, industry is moving to small communities and even farms, so that the future may show a greater incidence of these poisonings outside the large cities. It is the chronic type that may be the more common in the future, because the general population is becoming better educated to the acute dangers. As we have around us the increasingly common use of the automobile, the aeroplane, the motor boat, the welding apparatus, and gas, oil and coal for heating purposes, we should be alert to the danger of carbon monoxide poisoning. As we still use paint, printer's ink, other lead products such as plumbers' supplies, storage batteries and rodent and insect sprays and baits, we should remember arsenic and lead as important causes of industrial poisonings.

THE TREATMENT OF THE COMMONER INDUSTRIAL POISONINGS—LEAD ARSENIC AND CARBON MONOXIDE*

HAROLD N. WRIGHT

Assistant Professor of Pharmacology, University of Minnesota
Minneapolis

Treatment of Lead Poisoning

AFTER lead has been absorbed into the blood stream, a small fraction of it continues to circulate in the blood stream, being found in both the plasma and erythrocytes as colloidal tertiary lead phosphate. The greater portion of the lead is, however, stored in the hard bone of the skeleton as tertiary lead phosphate. The onset and severity of the symptoms of chronic lead poisoning are in large measure controlled by the relative balance between the lead circulating in the blood stream and that stored in the bones.

Conditions which favor the storage of lead in the bones decrease the concentration of lead in the blood, reduce the excretion of lead, and relieve (or prevent the onset of) the symptoms of chronic poisoning. Conditions favoring the mobilization of lead, conversely, result in an increased concentration of lead in the plasma and red cells, increased urinary excretion of lead, and, if the mobilization of the lead is sufficiently rapid, symptoms of chronic poisoning will be produced.

---

*From the Department of Pharmacology, University of Minnesota, Minneapolis. Read at the annual meeting of the Minnesota State Medical Association, Duluth, July 18, 1934.

The lead stored in the bones, therefore, while inert as long as it remains in the bones, constitutes an ever-present danger to the patient because (a) the continued presence of lead in the circulation possibly years after exposure to the lead has ceased may result in fibrous and sclerotic pathological changes in various organs and (b) dietary changes or totally unrelated pathological conditions favoring mobilization of the lead may cause symptoms of chronic lead poisoning to develop and be superimposed on other serious disease conditions.

The storage or mobilization of the lead is readily controlled by varying the calcium and phosphorus balance. Conditions resulting in a positive calcium balance with a low phosphorus intake cause storage of the lead in the bones and relieve the symptoms of poisoning. This may be accomplished by the administration of calcium lactate or calcium gluconate, and by the use of a diet high in calcium, especially milk, eggs, green vegetables and fruits (except apples and bananas).

There are a number of factors which favor mobilization and excretion of the lead. A low calcium - high phosphorus diet causes rapid mobilization and excretion of the lead. Foods low in calcium include meat, potatoes, rice, macaroni, milk-free bread, apples, bananas, sugar, salt, and butter which has been melted and skimmed off the top of hot water. Foods having a high phosphorus content include lamb, liver, eggs (high Ca), halibut, whole wheat bread, potatoes and green peas.

Acidosis, clinical or pathological, markedly increases the mobilization and excretion of lead. Clinical acidosis may be produced by the administration of acids such as hydrochloric, lactic or phosphoric acid, or ammonium chloride (8 to 12 gm. per day). Diluted phosphoric acid, U.S.P., 20 to 25 c.c. per day, well diluted and sweetened to resemble lemonade, is particularly effective since it provides a high phosphorus intake as well as producing acidosis. The excretion of lead is increased about four times.

It is well to bear in mind that pathological conditions causing acidosis, *e.g.*, diabetes, overexertion, anesthesia, etc., may cause symptoms of chronic lead poisoning to develop in patients who give no immediate history of exposure to lead, and who indeed may not have been exposed to lead for years.

Treatment of Arsenical Poisoning

The storage of arsenic in the tissues after absorption is markedly different from the storage of lead. After absorption arsenic is stored in all tissues of the body, principally in the liver, kidneys, heart and hair, and to a lesser extent in the skeletal muscles and brain. The exact form of its combination in the body is not known, but it has been identified in the liver of dogs as an arsenical nucleoprotein.

The excretion of arsenic is slow, requiring up to seventy days after repeated exposure or administration, but, of course, is much less persistent than lead. Unlike lead poisoning, the storage or excretion of arsenic cannot be influenced by dietary means.

The best treatment for chronic arsenical poisoning is the combined internal and external use of sodium thiosulphate (Na hyposulphite, photographer's "hypo"). The mechanism of its usefulness is not known. McBride and Dennie (1923) advocated the use of sodium thiosulphate particularly in the treatment of cases of arsphenamine dermatitis. These workers claimed that the thiosulphate converted the arsenic into insoluble and non-toxic sulphides, but this does not appear to be true since thiosulphate does not increase the fatal dose of arsenic. Myers (1925) has shown that thiosulphate increases the excretion of arsenic in a percentage of cases.

Sodium thiosulphate may be administered internally either orally or intravenously in doses up to 2 gm. per day, and externally as a 1 to 2 per cent aqueous solution. Externally it is extremely effective in treating and preventing the arsenical dermatitis and mucous membrane lesions of persons coming in contact with arsenic-containing dust.

Sodium thiosulphate is also effective in treating other forms of chemical and drug dermatitis. It has been employed particularly in the treatment of poisoning with other heavy metals, especially mercury, in which it is quite effective, and lead, in which the results are of doubtful value. It has been used with considerable success in the treatment of dermatitis due to sensitivity to drugs, especially the barbital hypnotics, the coal tar antipyretics, and bromides.

Treatment of Carbon Monoxide Poisoning

Carbon monoxide poisoning is essentially an asphyxia of the blood stream, the carbon monoxide being combined with the hemoglobin of the erythrocytes with an affinity more than 200 times that of oxygen. It is equally important to bear in mind the fact that asphyxia and respiratory failure are not the same thing. A patient may be very seriously asphyxiated with carbon monoxide without showing any immediate paralysis of the respiratory center; in fact, for several hours the respiration may be increased. The chief aim of the treatment of carbon monoxide poisoning should, therefore, be to restore the oxygen-carrying power of the blood.

Most of the treatments proposed for carbon monoxide poisoning have been the hypodermic administration of respiratory stimulants such as metrazol, homocamfin, alpha-lobeline, and atropine, although they do not strike at the real cause of the poisoning.

The use of methylene blue (methylthionine chloride) has been extensively advocated recently in the treatment of carbon monoxide poisoning as well as in hydrocyanide poisoning. Since Wendel (1933) has shown that methylene blue acts by converting hemoglobin to methemoglobin, with which the carbon monoxide then combines to form carbon monoxide methemoglobin, it is apparent that the administration of methylene blue in carbon monoxide poisoning can do only harm by still further reducing the oxygen-carrying power of a blood already in an advanced stage of asphyxia.

The most satisfactory treatment of cases of carbon monoxide poisoning is the use of inhalations of oxygen containing 7 to 10 per cent of carbon dioxide. This maintains respiration, oxygenates the blood to its fullest possible extent and with each respiration washes out some of the carbon monoxide. In New York City, where such treatment has been in routine use for the past six years, the annual number of deaths from carbon monoxide poisoning during that period has been 611, 570, 525, 435, 305 and 278.

CASE REPORTS

ACUTE PERFORATIONS OF THE GASTRO-DUODENAL AREA, WITH SPECIAL REFERENCE TO THOSE OF TRAUMATIC ORIGIN*

JAMES MORROW, M.D.

Austin, Minnesota

In much of the literature dealing with acute perforations of the stomach or duodenum, we find the apparently innocent remark "that these perforations may at times be of traumatic origin." And because so little attention is usually given to these traumatic perforations, one finds little in the literature concerning them.

It is recognized that there is an "area of gastric vulnerability"—the projection of the stomach on the anterior abdominal wall. Normally the stomach is to the left of the liver, between it and the left costal cartilages. Frequently it passes to the right of the median line; most always, if distended. In the median line the stomach area measures some 2.5 to 4 cm. and its lower border, as the greater curvature, slopes upward and to the left. The variation in the size and position of the stomach is so great that it is entirely conceivable that almost any kind of trauma to the abdominal wall may involve the stomach.

The following cases are from a group of eleven perforated ulcers seen over a period of ten years. Of these eleven patients, nine recovered and two died (mortality 18.+ per cent). Ten were in men; one of the fatal cases a woman. Age incidence was from twenty-two to fifty-seven, with an average of 34.6 years. Hospital days, excluding the two fatal cases, were from eleven to forty-three days, with an average of fifteen days. Of the two fatal cases, one died the day of operation, the other four and one-half days post-operatively, both from peritonitis. The time between the onset of symptoms and time of operation varied from one hour to four days. The average elapsed time for these cases of traumatic origin was slightly under three hours. Of the three patients operated on after twenty-four hours, two died.

The cases of traumatic origin are briefly summarized as follows:

Case 1.—Laborer, aged thirty-four, employed by a trucking concern, as helper. While unloading cartons of crackers, which were being thrown from the truck to the helper who stood on the sidewalk, he was struck by a corner of a wooden box directly in the abdomen. This occurred at 10 a. m., three and one-half hours following breakfast. He had no great discomfort for about ten minutes, when he was seized suddenly with great abdominal pain. He was helped into the truck, laid on the floor, and was brought to the office. He was in great pain, but not in shock.

---

*Read before the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

Examination showed temperature normal, pulse 88, breathing slightly increased and painful. There was complete constant rigidity of the abdomen. The leukocyte count was 8,600 (71 per cent p.m.n.). There was no history of any previous stomach ailment. Pain and rigidity were so marked that he was operated on about seventy minutes following the accident. A small soft ulcer, 2 mm. in diameter, was found in the duodenum. Simple closure of the ulcer was done, the abdomen being closed in layers without drains. Recovery was uneventful. Compensation was allowed.

Case 2.—Automobile mechanic, aged forty-two, was underneath a large sedan adjusting the brakes, when the jack slipped from the front axle and the car dropped upon him, the oil pan of the motor striking his abdomen. When the car came to rest after the rebound from dropping, the man could be pulled out from beneath the car so that the impact of the falling car was the immediate and only causative factor in his accident. There was immediate severe abdominal pain.

The man was seen shortly after the accident. The pulse was 92, temperature 99.2, leukocyte count 9,600 (76 per cent p.m.n.). There was severe pain and a most marked persistent rigidity.

At operation, a small soft ulcer in the duodenum was found perforated. Simple closure was accomplished without drainage. Recovery was uncomplicated. Compensation allowed.

Case 3.—Laborer, twenty-two years old, employed by a house mover. While helping to locate rollers under a large house, using a chain wrench, the roller slipped and the long handle was swung violently backwards, striking him across upper abdomen. The blow "knocked the wind out of him," but in a few minutes he recovered. This accident occurred about 30 minutes prior to the usual hour to cease work. On the way home from work, riding in an auto, he was taken violently ill with severe abdominal pain and vomiting.

He was seen at his home about one hour following the accident. In this interval he had vomited a "dozen times." There was marked pain, constant in character, with complete rigidity. His temperature was 97.6, skin cold and clammy, pulse 104. He was brought to the hospital, where operation two hours after injury revealed a soft type, small perforated ulcer of the duodenum. Simple closure was made without drainage. Recovery was uncomplicated. His leukocyte count immediately prior to operation was 8,600. This case was denied compensation on the basis that disability was not "immediate and continuous."

Case 4.—A man, aged forty-three, manager of a small chain department store. This man had the well deserved reputation of being a hard drinker. About five o'clock one afternoon he became engaged in a quarrel with one of his employees, the quarrel ending by the employer being punched violently in the abdomen by the attacking employee. The man was assisted to his living quarters in one of the hotels, where he promptly increased his pre-existing state of intoxication by drinking a large quantity of whiskey. About three hours after this, the hotel clerk called to see the man, as he was "drunk and very noisy."

When seen, the man presented the classical picture of intoxication. It was entirely impossible to obtain any information from him, and no history of the accident was known until the next day. He had been vomiting, so gastric lavage was done and the man given a hyoscine-morphine-cactine tablet (No. 1) hypodermically.

About an hour later, I was again called to see the man, because he was "still very noisy." A rather different picture presented itself on this second visit. The man presented evidence of shock, with cold perspiration and subnormal temperature. His leukocyte count was 38,000. At almost clock-like intervals, he would be seized with severe abdominal pains. The interval was just under two minutes, and the pain would last about twenty seconds, when there would be apparently complete relaxation until the next attack. He had vomited several times since the lavage, but never any macroscopic blood. Over the right lower quadrant was a well healed scar, measuring 3.5 inches in length. It was felt that this ruled out any possibility of this condition being of appendiceal origin. (Later it was learned that this scar was from a bayonet wound and that the appendix had never been removed.)

A diagnosis of a perforated ulcer was confirmed at operation, which was done about six hours after the initial injury. In this case the ulcer was found on the gastric side of the pylorus, anteriorly and above, measuring 5 mm. in diameter and with induration around it. A marked chemical peritonitis likewise existed in this case. The ulcer was excised and a gastroenterostomy performed. A soft rubber drain was used and removed on the third day.

This man had a very stormy convalescence, being complicated by delirium tremens. He recovered after a hospital stay of forty-three days. Strange to relate he was granted compensation for the injury and its consequences, on the basis that the injury occurred "in line of duty."

Case 5.—A student, aged twenty-two, while driving a small delivery truck ran into the back of a large truck parked on the highway. He was thrown forward against the steering wheel and cowl of his truck. He was brought by ambulance to the hospital shortly after the accident.

Examination showed no external injuries except marked swelling and contusion of the right knee, with an underlying shattered patella. He complained of severe pain across his shoulders, on the anterior chest wall, and in the abdomen. He was put to bed, the leg temporarily splinted and local applications to the knee applied. In a very short time, his chief complaint was the severe abdominal pain, which was constant in character, and definitely increasing in severity. There developed a generalized rigidity. There was practically no shock in this case, temperature normal, pulse only slightly increased, and a leukocyte count of 6,700.

On operation, a small soft perforation was found on the anterior wall, near the ascending distal curve of the greater curvature of the stomach. There was definite contusion of the stomach wall in this case, surrounding the perforation. A simple closure of the perforation was done. No drainage was instituted in this case, and the recovery from the laparotomy was uneventful. The patella was treated by open reduction. Compensation was allowed for all injuries received.

These five cases comprise those in which trauma was distinctly a causative factor. Whether or not there was any preexisting condition, which would have a bearing on the perforation, is impossible to state. However, a few factors are interesting which were uniformly present in each of these cases.

Not one of these five patients gave any history of a preexisting ulcer, or of any ulcer symptoms. None had consulted a physician or taken any medication. This particular question was rechecked following operation to be especially sure. Knowing the tendency of the laboring man to hide any symptoms he believes may have an unfavorable bearing on his case, the question was again asked after adjudication of their claims had been completed. All still claimed that there were never any previous symptoms.

Numerous reports have been made relative to spontaneous perforation following a heavy meal, or following a barium meal for fluoroscopy. In all these reported cases, however, the accident occurred some little time after any meal, so that in all probability the stomach was empty. In this regard, it is well to recall that, though the stomach is empty, it may not be relaxed, but contracted, and under tension. Peristalsis usually begins about the middle of the organ, and consequently tension exists in both the proximal and distal portions. It would seem to me that perforation from trauma would be more likely to occur with a contracted empty stomach than at any other time, because of this tension.

Operative Procedures

Pre-operative.—Although there are many who frown upon the practice, we do use methylene blue solutions in any case where the preoperative diagnosis includes any possibility of a perforation. A small amount of sterile water, deeply colored by the dye is given to the patient before the operation. This practice definitely stains the leaking stomach contents and helps in the localization of the perforation. Time is an element in these operations, and this procedure does save time. Following closure, a clean sponge held against the operative site, with gentle pressure on the stomach, will show leakage if any exists. The argument advanced that it is another possibility for infection hardly seems justifiable, when one considers that the normally infected stomach contents are already leaking into the peritoneal cavity. Neither do I make any claim for any bacteriological effect of the dye, but I do say it simplifies the operative procedure.

Operative.—A high right rectus incision is usually advocated as giving the best exposure over the site of the most frequently perforating area. Simple closure of the perforation, using a Lembert suture rather than a purse-string, the tacking of a small omental pad on the area, may be the only repair indicated. A gastroenterostomy may be indicated, provided the patient's condition warrants any additional surgery, and if there is reason to believe that such a procedure will afterwards benefit the patient. Simple excision of the area hardly seems more practical than closure alone and pylorectomy or partial gastrectomy only increases the possibility of complications. No set rule can be laid down; each case will govern the operative procedure. Yet one can find statistics which show that each procedure is the best one.

Drainage likewise depends on conditions encountered. If the amount of fluid in the abdominal cavity is large, there is probably more logic in drainage. Ordinarily, drainage can be dispensed with in the majority of cases without need of any timidity on the part of the surgeon.

Postoperative.—Though the peritoneal irritation is chemical in origin, the possibility of pocketed abscess is ever present, so that each case should be considered as a potential peritonitis, and emphasis should be placed on fluids forced by all routes except by mouth. Liquid diet may be given the day following the operation, and soft bland diet after the third day if there are no contraindications, and simple closure has been made. The operative procedure employed will greatly influence the diet selected.

Drains if used are always removed entirely by the third day.

Anesthesia.—Two of the five cases reported were seen since we began the use of spinal anesthesia. In one of these, the fourth case, a low blood pressure and evidence of shock contraindicated its use. In the fifth case, spinal anesthesia 150 mgm. novocain was used with most satisfactory results. The other patients were operated upon under inhalation anesthesia.

Summary

A few cases are herein reported wherein quite definitely trauma was the causative factor in perforation of either the stomach or duodenum.

Perforations do occur where there have been no previous symptoms of any pathological condition existing at the site of the perforation.

Time is a most important element.

Operative procedures depend upon the individual case, and one should not be too zealous over any one method. All are good if the primary aim of saving the patient's life is accomplished.

THE LOCALIZATION OF BONES IN THE ESOPHAGUS BY ROENTGENOSCOPY*

PORTER P. VINSON, M.D.
and
HARRY M. WEBER, M.D.
Rochester, Minnesota

Bones, especially those from fish, beef, and chicken, are frequently encountered as foreign bodies in the esophagus. Those from fish are usually straight and slender and, if they do not stick in the tonsil, base of the tongue, or hypopharynx, they pass into the stomach and are spontaneously expelled through the intestinal tract. Larger, irregularly-shaped pieces of bone, such as are found in the lutefisk, may become impacted in the esophagus and require esophagoscopic removal.

When beef or chicken bones are accidentally swallowed, they are of such size and shape that lodgment in the esophagus is a frequent occurrence, and unless they are removed promptly, they may produce a profound inflammatory reaction which results in perforation of the esophagus and in the development of a rapidly fatal mediastinitis. This inflammatory change is especially noted when meat is attached to the bone. Early recognition and removal of any foreign body in the esophagus is desirable, and, if the foreign body is a spicule of bone, delay in making a direct examination of the esophagus through an esophagoscope may subject the patient to unwarranted hazards.

Metallic foreign bodies in the esophagus are detected

---

*From the Division of Medicine and Roentgenology, The Mayo Clinic, Rochester, Minn.

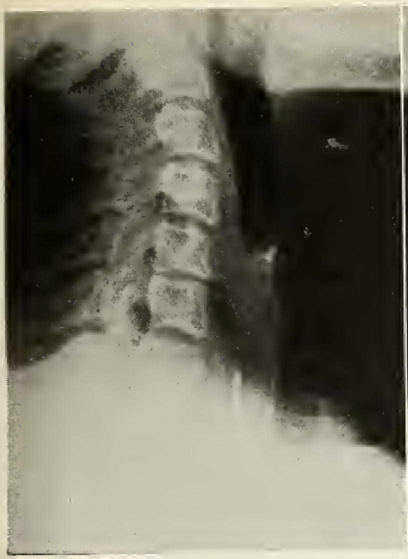


Fig. 1. Lateral view, revealing bone in upper portion of esophagus.

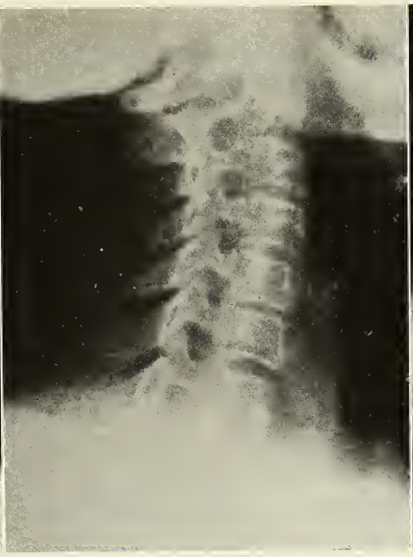


Fig. 2. Oblique view, faint shadow of bone is apparent in upper portion of esophagus.

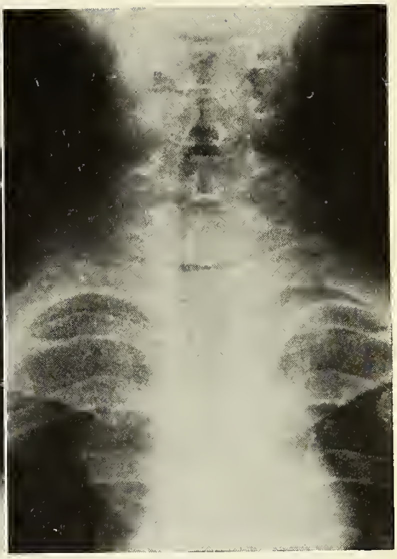


Fig. 3. Anteroposterior view, the thinness of the bone prevented localization in this film.

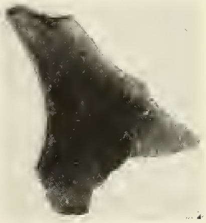


Fig. 4. Foreign body removed from esophagus.

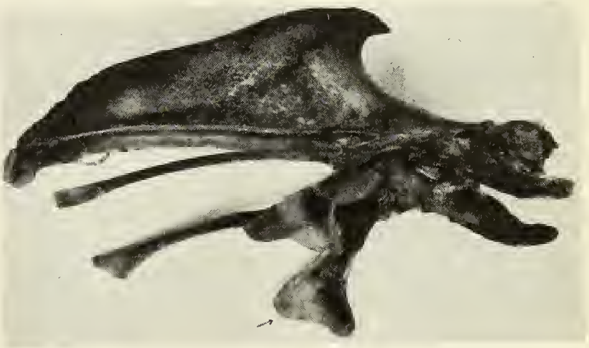


Fig. 5. Sternum of chicken, showing flattened tip of lateral external process which is frequently encountered as a foreign body in the esophagus.

with the greatest ease by roentgenologic examination; however, when the foreign body is a piece of bone, this method of examination may not furnish as much information. Fish bones are only rarely demonstrated by roentgen rays, and even large meat bones may fail to cast a sufficiently opaque shadow to permit their identification.

Many roentgenologists advocate the ingestion of small amounts of barium mixture in searching in the esophagus for foreign bodies that are not opaque to roentgen rays. This method may be of value to the roentgenologist, but when an esophagoscopic examination is carried out immediately afterward, the barium mixture may coat the esophagus to such an extent that the foreign body cannot be visualized. Unless an anteroposterior or lateral roentgenogram of the esophagus reveals a foreign body, further roentgenologic study should be deferred, in case the history suggests the presence of a foreign body, until an esophagoscopic examination has been made.

A foreign body in the esophagus should be suspected when dysphagia develops very suddenly or when there is a sensation of "something sticking in the throat," especially if the sensations occur while eating chicken salad, hashed or cream chicken, meat chops, or soup. Patients who swallow bones usually have complete dentures, or at least an upper plate, and ordinary sensation derived from the hard palate is absent. In the following case the chicken bone was of the type that is most often encountered in the esophagus. In this case it was clearly demonstrated in a lateral roentgenogram.

Report of Case

A woman, forty-nine years of age, had swallowed a piece of bone while eating creamed chicken with noodles, November 16, 1934. The following day, a roentgenogram had been taken at her home and a piece of bone was visualized on lateral exposure of the esophagus. Esophagoscopy had been performed, with the patient under general anesthesia, and a tiny fragment of bone had been removed. After this, the patient had felt quite comfortable. Subsequent roentgenologic studies revealed that the foreign body was still present, and she was sent to The Mayo Clinic for further treatment.

On her arrival at the clinic November 22, she was quite comfortable and said that the soreness in her throat incidental to esophagoscopic examination was gradually lessening and that she believed that the bone had been removed entirely from the esophagus. General examination gave negative results. The patient had complete artificial dentures.

On roentgenologic examination of the esophagus, a lateral view revealed a foreign body which was less noticeable in the oblique position and was not visible on anteroposterior exposure (Figs. 1, 2 and 3). From these findings it was suspected that a large, flat piece of bone was present in the upper portion of the esophagus.

On November 23, esophagoscopy was done under local anesthesia and the piece of bone (Fig. 4) was removed without difficulty. The patient returned home the following day.

The portion of bone ingested was the tip of the lateral external process of the sternum (Fig. 5).

MALIGNANT HYPERTENSION—SPLANCHNIC NERVE RESECTION*

C. KOENIGSBERGER, M.D.

Mankato, Minnesota

Mr. P. H., aged forty-four, presented himself to me in December, 1933.

Chief Complaint.—Severe, almost continuous, occipital headache.

Previous Medical History.—Entirely negative, except for a mild attack of influenza in 1920, and a tonsillectomy three years ago for chronic recurrent tonsillitis.

Family History.—Essentially negative. There is no history of cardiovascular disease in parents or other members of his family.

Present Trouble.—Patient stated that for past year he has suffered from almost continuous, severe occipital headache. Six months ago he consulted a physician, who found that he had a very high blood pressure, and prescribed some tablets for the purpose of reducing this pressure. However, this treatment procured no relief. He has tried all the different varieties of headache tablets, without result. He stopped his work and went to bed for two weeks, but the headache continued. During the past six months, he has been working intermittently, and during his work periods his efficiency has been greatly lowered. For the past month his condition has been much worse. Headache is exceedingly severe and is present all of the time, and there are episodes of vertigo and vomiting. He is unable to sleep, and is willing to do anything to get relief. There are no other symptoms.

Physical Examination.—The patient is large framed, weighing 186 pounds, but not obese. General condition good. Patient appears to be in pain.

Eyes: Pupils equal—react to light. Ocular movements normal. No nystagmus. No exophthalmos.

Mouth: Tonsils out. Teeth in good condition. Tongue coated and moist.

Neck: Thyroid is not enlarged. Moderate cervical adenitis.

Heart: Left border—apex impulse at the nipple line. Right border—normal to percussion. Heart sounds regular in rhythm. Normal in rate. There is a soft systolic murmur over the aortic area. Second aortic sound is loud and snapping.

Lungs: Negative throughout.

Abdomen: Soft, relaxed. No masses—no tenderness.

Extremities: Negative. No edema.

Peripheral Vessels: Only moderately sclerosed—not beaded—not tortuous. Sclerosis graded I. Blood pressure 200/130.

Rectal: Negative.

Neurologic: Essentially negative.

Ophthalmoscopic Examination.—Retinal vessels show moderate sclerosis and notching. No exudate. No hemorrhages. Same papilledema of both disks, especially on nasal side. Area of old choroiditis at the base of the right fundus.

Laboratory.—The urine on repeated examinations is negative, showing a specific gravity of 1.015, no sugar, no albumin, no casts, no pus cells. Blood chemistry normal. P. S. P. 70 per cent excretion in one hour. Hemoglobin 80. White blood count 8,600. Blood Wassermann negative.

Diagnosis.—On the basis of the patient's age, the acute nature of the disorder, and the beginning papilledema, diagnosis of malignant hypertension was made.

Treatment.—Some months ago, while I was visiting at the University of Michigan, Dr. Max Peet showed me a case of this type, in which he had accomplished resection of the splanchnic nerves, with an exceedingly good therapeutic effect.

Based upon this experience, it was determined to make a resection of the splanchic nerves in this case. Accordingly, on December 13, 1933, under spinal anesthesia, the left greater and lesser splanchnic nerves were resected by Dr. A. E. Sohmer. The operation was terminated, it being the purpose to resect the right side at a later date.

For three days following this operation, the patient was in a condition of extreme cardiac collapse, during which time he was placed in an oxygen cabinet. On the fourth day his condition showed improvement, which continued, and he was discharged from the Hospital on December 23, ten days after operation.

Result.—The blood pressure was depressed during the operation, by reason of the spinal anesthesia, and remained so during his convalescence. The patient stated that immediately after operation his head felt clearer than it had at any time for the past six months. He has remained practically free of headache—has returned to his work, which is that of a foreman in a stone quarry. On June 30, six months after operation, his blood pressure was 165/100, and the eye-grounds were normal, except for evidence of very moderate arterial thickening.

On examination, August 13, 1934, the blood pressure was 130/100. There was no papilledema. Thus far we can see no reason to resect the nerves on the other side.

Comment.—Vascular hypertension is a vicious circle, producing as it does a chronic trauma to the arterial wall. This trauma results in stretching and injury with reparative fibrosis which equals arteriosclerosis. The more hypertension, the more arteriosclerosis, and the more arteriosclerosis, the more hypertension—thus completing the circle.

Malignant hypertension appears to be a separate entity, occurring in the earlier decades, and is perhaps of an infectious origin. Considerable evidence can be brought to bear to sustain this point. The subject of this report had a history of severe recurrent episodes of tonsillitis.

If, in a case of this type, the vascular bed, at some point, can be released from sympathetic control, the resultant vasodilation will mechanically reduce the vascular tension, thus breaking the circle. This must be done early in the disease, while the vessels still retain some resiliency.

This procedure has been accomplished in a few cases, including the subject of this report. It is yet too early to comment on the permanence of this result.

---

*From the Mankato Clinic. Presented at the annual meeting of the Southern Minnesota Medical Association, Faribault, Minnesota, August 24, 1934.

EDITORIAL

MINNESOTA MEDICINE

OFFICIAL JOURNAL OF THE MINNESOTA STATE MEDICAL ASSOCIATION

Published by the Association under the direction of its Editing and Publishing Committee

EDITING AND PUBLISHING COMMITTEE
J. T. CHRISTISON, Saint Paul
A. S. HAMILTON, Minneapolis
E. M. HAMMES, Saint Paul
T. A. PEPPARD, Minneapolis
WALTMAN WALTERS, Rochester

EDITORIAL STAFF
CARL B. DRAKE, Saint Paul, Editor
W. F. BRAASCH, Rochester, Assistant Editor
C. A. MCKINLAY, Minneapolis, Assistant Editor

Annual Subscription—$3.00. Single Copies—$0.25
Foreign Subscriptions—$3.50.

The right is reserved to reject material submitted for editorial or advertising columns. The Editing and Publishing Committee does not hold itself responsible for views expressed either in editorials or other articles when signed by the author.

Classified advertising—five cents a word; minimum charge, $1.00. Remittance should accompany order.

Display advertising rates on request.

Address all communications to Minnesota Medicine, 2642 University Avenue, Saint Paul, or 324 Fourth Avenue South, Minneapolis. Telephones: Nestor 1381 and Dupont 1013.

BUSINESS MANAGER
J. R. BRUCE, Saint Paul

Volume 18 APRIL, 1935 Number 4

Vitamin D Milk

The physician is frequently called upon to explain the value of vitamin D milk. Vitamin D milk is pasteurized, certified, or evaporated milk, with vitamin D added. This milk is extensively advertised to the public as a preventive of rickets and a safeguard to health, often leading to misunderstanding. This is inevitable since distributors of vitamin D milk are primarily interested in promoting sales.

There are three methods of increasing the vitamin D content of milk: yeast feeding, direct irradiation, and the addition of concentrates.

Certified milk is vitaminized by feeding irradiated dry yeast to the cattle. Every cow receives an average ration of 4.5 ounces of irradiated dry yeast daily. This process produces about 150 Steenbock units per quart of milk.

The direct irradiation method is employed most extensively in the vitaminization of evaporated milk. It is practical and economical in the treatment of large quantities of milk. The milk is flowed in a thin film subject to the direct exposure of rays from a carbon arc lamp, mercury vapor, or cold quartz lamp. This method produces about fifty Steenbock units per quart.

Pasteurized milk, which forms the principal supply in the larger Minnesota cities, is fortified by the addition of cod liver oil concentrates. The cod liver oil is extracted with alcohol, the extract saponified and precipitated as calcium soaps, the D concentrate extracted therefrom with acetone. This is called the Zucher concentrate and is added to the milk at the time of pasteurization or bottling. Each quart of milk contains about 150 Steenbock units.

Obviously it would be unwise to permit the indiscriminate vitaminization of all foods. However if it be of value to provide additional vitamin D for the general population, particularly for children, milk should be the logical vehicle.

The housewife is sometimes misinformed that vitamin D milk is an adequate substitute for cod liver oil, which in addition to D vitamin contains A vitamin. Milk drivers are instructed to increase the sales of vitamin D milk and in their enthusiasm misinform the customer mothers that vitamin D milk is a complete substitute for cod liver oil. I believe we are agreed that milk lacks D vitamin, that it is desirable children have additional D vitamin, particularly in early life and during the winter months. Vitamin D milk contains enough D vitamin to be of antirachitic value and not sufficient to cause toxic effects even if given in addition to cod liver oil or one of its substitutes. If a child is given cod liver oil, haliver oil or tuniver oil under the directions of the doctor, there is certainly no need of giving vitamin D milk.

We may rationally advise: (1) that vitamin D milk is an excellent medium of giving additional vitamin D to the well child; (2) that it should not be depended upon as an absolute preventative or cure of rickets to the exclusion of cod liver oil, haliver oil, or tuniver oil; (3) that even if given in addition to cod liver oil the intake of vitamin D is not sufficient to produce toxic effects; (4) that vitamin D milk is not a complete substitute for cod liver oil, haliver or tuniver oil, and if a child is taking cod liver oil or one of its accepted substitutes there is no need of substituting vitamin D milk for ordinary milk.

F. G. HEDENSTROM.

May Day and Diphtheria Immunization

May Day, 1935, has been designated by the Committee of the State and Provincial Health Authorities of North America and also by the American Child Health Association, as the day of the year for concentration on the subject of diphtheria immunization.

While the designation of one day in the year to some specific cause which merits consideration every day in the year has been much overdone, the custom has publicity value. And publicity is of prime importance in disease prevention.

Universal vaccination against disease is very limited in application. The medical profession has been unanimous for years in its recommendation of universal smallpox vaccination. The results of diphtheria immunization have reached a point where its universal application should be heartily endorsed by the profession. Beyond this universal vaccination is not recommended.

A child six months or over is of suitable age for diphtheria immunization and because of the relative high mortality from the disease between the ages of six months and six years, inoculation at an early age is indicated. As pointed out in an editorial in our February number, the three inoculations with toxoid produce a higher percentage of negative Schick tests although the single dose of alum-precipitated toxoid is not without value. For routine immunization a repitition of the plain toxoid after a three weeks' interval is the best procedure.

Physicians through their advice to patients and their readiness to perform diphtheria immunization in children can coöperate with health officials in attempting to reach the goal of universal diphtheria immunization.

Clinic Criticized

According to Webster a clinic may be the instruction of a class by examination and treatment of patients or an institution connected with a medical school or hospital devoted to free treatment of patients. Webster does not authorize the use of the word clinic for a group of specialists associated in practice, common in the West.

In a recent article by Edna B. Mann* the unfortunate experiences of a patient who sought the services of a "clinic" or free dispensary are related in detail. The long waits, delayed laboratory procedures, different doctors, lack of privacy and withal inefficient handling were all so galling that she borrowed some money and sought a private physician with highly satisfactory results.

The recital is doubtless an actual experience. Similar experiences could easily be found. It is equally true that some free clinics give highly satisfactory service, and all should not be condemned.

It is a fact that most free clinics are inclined to be overcrowded and undermanned. Some are forced to utilize an inexperienced medical personnel, and needless laboratory procedures and medication are likely to be in evidence.

In the set-up of a free clinic, just as in the panel system, individualization is handicapped. In such a clinic many patients are seen by a number of physicians and responsibility is easily divided. In the panel system the number of cases and not the quality of work is important.

The article referred to simply emphasizes the fact that the human being is a very complicated machine and demands individual medical care. No better boost for private practice could have been written.

Annals of Medical History

In the fall of 1917 shortly after our country entered the World War and at a seemingly most inopportune time, a group of courageous medical men launched a publication known as the *Annals of Medical History*. Its excuse was the growing interest in medical history and its pages were to be devoted to only high grade contributions to medical history. Those who have followed the appearance of the *Annals*, four numbers a year until 1929 and six a year since that time, under the able editorship of Francis R. Packard of Philadelphia, know how well the high aim of this journal has been reached. Each year's volume is a gem.

Now comes the disheartening news expressed in an editorial in the January issue of the *Annals* that "the *Annals* is faced with the unpleasant possibility that it may have to suspend publication" for financial reasons, and if so "it will be many a long year before a publisher will be found of sufficient courage and disinterestedness to undertake a similar project." Almost in a

---

*Mann, Edna B.: Cured by clinics. Abstracted from *Modern Monthly*, January, 1935, by *Readers' Digest*, March, 1935.

class by itself, the *Annals* carries no advertising and depends entirely on the subscription price of ten dollars a year for its maintenance. Subscriptions have fallen off and there is danger that this outstanding publication, born in troublous times and surviving the recent depressing five years, may not carry on.

We have been asked along with the editors of other state journals to lend our assistance to the *Annals* by calling attention to this unfortunate situation. We feel that we are rending a service in calling the attention of those who do not know the *Annals* to this really remarkable example of what can be done in this country in the way of a medical publication. It is worth the subscription price, if one has the required ten dollars. If not, surely there are many groups of five or ten medical men in or outside of county medical societies who would be willing to get together to subscribe to this publication. It has been pointed out that ten additional subscriptions from each state will meet the situation.*

VIOSTEROL PREPARATIONS AND GALLSTONES

The widespread clinical administration of viosterol preparations has raised problems concerning several possible late effects and side actions. Among these questions is that of the formation of gallstones. Jones and Laing (Am. J. Physiol., 110:471, (Dec. 1) 1934) have recently undertaken to ascertain whether the current use of viosterol preparations might lead to an increased output of calcium in the bile in dogs. One hundred and ninety-three analyses of bile calcium before the administration of a viosterol preparation were made and seventy-three after the daily administration of from 5 to 10 c.c. of viosterol in oil. From the results obtained by these investigators it was evident that doses of viosterol preparations considerably larger than would ordinarily be used in clinical practice do not raise the bile calcium concentration or modify bile output in the dog. Doses of viosterol preparations large enough to increase definitely the blood calcium level will increase the bile calcium concentration and decrease the output of bile. Jones and Laing hoped to obtain clinical confirmation on patients with chronic biliary fistulas but had not yet been able to do this. When and if confirmation is obtained, one more possible danger of viosterol administration will be eliminated.—*Journal A. M. A.*, February 23, 1935, p. 655.

OF GENERAL INTEREST

Dr. A. W. Nuetzman, of Faribault, has become associated with the Central Clinic.

* * *

Dr. and Mrs. M. L. Mayland, of Faribault, are sojourning in Florida for several weeks.

* * *

Dr. D. W. Francis, formerly connected with the Faribault Clinic, has resumed his practice at Morristown, Minn.

* * *

Dr. F. M. Jolin of Coleraine and Dr. Ray Jolin of Lake Park have opened an office in Grand Rapids, Minnesota, where they have established a practice.

* * *

Dr. S. B. Haessley, of Faribault, who has been incapacitated for some months because of a fractured hip, is able to be at his office for a part of the time each day.

* * *

The Minneapolis Surgical Society elected officers for the ensuing year at the regular meeting held March 7, 1935. Dr. F. A. Olson was elected president; Dr. R. R. Cranmer, vice president; Dr. E. A. Regnier, secretary-treasurer. Dr. L. Haynes Fowler (five years), Dr. O. W. Yoerg (four years) and Dr. Kenneth Bulkley (three years) were elected to the Executive Council.

* * *

Dr. George von Anrep, Professor of Physiology at the University of Cairo, Egypt, will lecture on the subject "Recent Advances in the Physiology of the Heart and Coronary Arteries" at the Medical Science Amphitheater on the University of Minnesota campus, April 5 and 8, at 8 p.m. Dr. Anrep took part in the Physiology Symposium held on the campus in 1929 and is celebrated for his researches. He is a former student of Pavlov and Starling. Physicians and other interested in the subject will be welcomed.

Warning—Affiliated Underwriters Loan And Finance Company of Evanston

Our attention has been called to the activity of the above collection agency in Minnesota and Iowa. We are reliably informed that this agency has the same officers as the Birdsall Loan and Finance Company, also of Evanston, Illinois. Many complaints have been voiced by members of the medical profession regarding the methods used by this latter agency in collecting accounts and the character of the contract made with the physician, whereby professional accounts are assigned to the company and the commission for collection of the total amount of the accounts is kept by the agency before the physician receives anything. Those who may be interested further should refer to the *Journal of the American Medical Association* for March 31, 1934, under the Medical Economics section.

---

*Subscriptions should be sent to Paul B. Hoeber, Inc., 76 Fifth Avenue, New York City.

MEDICAL ECONOMICS

Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association

B. J. Branton, M. D.　　W. F. Braasch, M. D., Chairman　　J. C. Michael, M. D.

"No Jump in the Dark"

One of the most interesting little documents of recent years to the thoughtful American is called "Will America Copy Germany's Mistakes?"

It is written by Gustav Hartz, labor economist and publisher of Berlin, former member of the Reichstag and a competent witness to the failure in Germany of the very social experiments now contemplated in America.

When Germany took its first step fifty years ago toward its present elaborate system it was, indeed, as Dr. Hartz points out, a "jump in the dark." Nowhere did experience in the matter exist.

For America it is not a "jump in the dark." Americans have the benefit of fifty years' experience of Germany, the fruits of which are suggested by the following comments from the Hartz pamphlet. Incidentally the pamphlet is available through the Pennsylvania Self-Insurers' Association, Finance Building, Philadelphia, and also from the New York Medical Society.

Poverty Made Permanent

Says Dr. Hartz:

Social insurance is not only caused by lack of means but aggravates it and makes it permanent.

* * *

The inability to work out an accurate actuarial estimate of sickness and unemployment risks makes it difficult, if not impossible, to create adequate financial reserves. At best the benefits provided are too little to live on and too much for starving.

* * *

Sickness insurance has weakened the will to get well and malingering is common with the result that the number of sick days lost from work has multiplied five times, even though health in general has improved all over the civilized world.

Drugs Restricted

It is not to be wondered at if the level of medical care is low. The amounts paid for single services or single patients are so small that the physician is driven to mass practice and forced to subordinate quality to volume.

* * *

The popular demand for expensive medicines has brought about restriction of the use of drugs: doctors may not prescribe what they think best, but what the medical regulations permit.

* * *

An extensive supervisory system has completely destroyed the confidential relationship between practitioner and patient.

* * *

Says the *New York State Medical Journal* in an editorial comment on the Hartz analysis which is printed in full in the issue of March 1:

> "Before our legislature votes to saddle the people with this incubus of compulsory health insurance—a burden that is more easily assumed than cast off—it should study Hartz's comprehensive analysis of the situation in Germany and consider whether precipitate action is necessary or justifiable."

Medical Pollyannas in California

At a recent meeting of the California State Medical Association's House of Delegates, the astonishing resolution printed below was adopted.

RESOLUTION NO. 2 INTRODUCED BY DR. IRVING S. INGBER AS AMENDED BY THE COMMITTEE

WHEREAS: The studies of the Committee of Five of the California Medical Association have shown the inability of a certain percentage of our population to adequately finance the cost entailed by illness; and

WHEREAS: Because of this economic situation proper medical care is beyond the reach of this population group; and

WHEREAS: It has been established that this problem can be alleviated by the utilization of the insurance principle;

Now, THEREFORE, BE IT RESOLVED, That the House of Delegates of the California Medical Association recommends that legislation be proposed seeking to establish a health insurance system, mandatory as to certain population groups and voluntary as to certain population groups, which shall include the following principles: No. 1. The pateint shall have absolutely free choice of physician and hospital; No. 2. The medical profession shall determine the scope, extent, standards, quality, compensation paid for, and all other matters and things related to, the medical and medical auxiliary services rendered under the system; No. 3. There shall be no provision for cash benefits; No. 4. The patient shall receive adequate treatment and his physician shall receive adequate compensation; No. 5. The foregoing principles shall be maintained with such modifications thereof as may from time to time be recommended, or approved by the profession;

AND BE IT FURTHER RESOLVED, That the California Medical Association immediately offer its full aid and coöperation to the Interim Committee of the Senate of the State of California charged with the study of this problem to the end that any measure which shall be passed establishing a health insurance system at the 1935 session of the California Legislature shall contain the above principles;

AND BE IT FURTHER RESOLVED, That there be formed a special committee authorized and empowered to act herein, constituted as follows: the Legislative Committee of the Association and three members of the Association to be appointed by the Speaker of the House.

It is difficult to understand how any group of medical men, with the present wide distribution of information on the economics of medicine, could have taken this action.

They have deliberately disregarded the experience of those unfortunate European countries that are struggling under the load of mandatory health insurance—as they have also disregarded the official disapproval by the House of Delegates of the American Medical Association of mandatory insurance in America.

"No Cash Benefits"

There shall be no cash benefits says this naive document. As though it had ever been possible or ever will be possible to divorce cash benefits from sickness insurance!

The experience of England has shown that cash benefits are inevitable—and also that the existence of these benefits is overwhelming the purely medical and preventive aspects of the system in spite of every effort to avoid it.

This California resolution also blithely promises that the patient shall have free choice of physician. It should be obvious to anyone that there can be no free choice under a mandatory system, operating through government bureaus, manned by government employees.

That medical practice could be controlled by medical men in competition with politics and political maneuvering is equally visionary.

It will require more than the expression of a pious wish, furthermore, for the patient under this politically controlled system to be certain of receiving "adequate treatment," or the physician adequate compensation.

The Poor Taxpayer

All this leaves out of account the overburdened tax payer who is already struggling under an impossible weight. He should be considered, too, before a new system of forced taxation for health insurance that will neither improve medical care nor extend its distribution is loaded upon him.

Members of the Minnesota State Medical Association are too well informed about the fundamental principles involved, we feel sure, ever to approve such a resolution in Minnesota.

County Officers Speaking

Two very important meetings from the standpoint of the social and economic progress of medicine in Minnesota were held in Saint Paul, February 23 and 24.

The first was the County Officers' Conference of the Minnesota State Medical Association; the second was the Northwest Medical Conference, now a nationally known conference, which has met each year since its organization by officers of the Minnesota association some eight years ago in St. Paul.

A lively interest on the part of the large number of officers and members who attended from all over the state marked the County Officers' Conference.

Relief, immunization campaigns, affiliate membership, state legislation, malpractice and the reports from Chicago of the delegates and Dr. R. G. Leland, director of the Bureau of Medical Economics of the American Medical Association, occupied the day-long session.

Below are some interesting excerpts from the report of the session which has been sent from the state office to all secretaries and committee chairmen.

Relief

"The County Medical Advisory Committee has done more than any other one thing to keep relief work running smoothly. Only the very best men should be appointed to serve on Advisory Committees and these men should be kept on the committees once they are familiar with the work."

Mr. George Crownhart, Madison, Wis.
Secretary Wisconsin State Medical Society.

* * *

"One of our chief objects at this conference today has been to find out whether we are operating satisfactorily on our original basis for payment of medical relief fees. In that agreement only a few definite fees were set. They were supplemented by a general reduction of 40 per cent from normal fees.

We now have the testimony of county officers and Advisory and Contact Committeemen from many parts of the state who are present here today to the effect that things are working out very well over the state.

"That being the case, is there any necessity for a more detailed schedule of fees? It is the opinion of your Council, arrived at after more than fifty hours of study of the situation and conferences with SERA officials, that, under the circumstances, there is no need for us to commit ourselves further."

Dr. H. Z. Giffin, Rochester
Chairman, Emergency Advisory Committee of the Council.

* * *

"Right now, many counties are short of funds for relief work. Only a certain amount of money is available from the federal government and eligibility for these funds is graded according to the amount of suffering due to drought, crop failure, et cetera.

"Keep track of your relief work and notify your relief worker. When funds are available you will be paid."

Dr. H. M. Johnson, Dawson
Chairman, Public Policy and Legislation Committee

* * *

"The question of privilege is important in connection with medical relief work. Remember—you doctors have no authority to disclose the secrets of your patients—even when it is a question of supplying information for the audit of bills under provisions of Federal Bulletin No. 7.

"If it becomes necessary to disclose the general nature of the illness of your patient, get an authorization to do so signed by your patient and protect yourselves.

"You cannot jump off and leave a case, as you know. The law forbids it and relief officials should recognize the law. That is why no one, not even the federal government, can tell you how many calls you can make on a patient. Congress has no authority over the practice of medicine in this state.

"The object of organized medicine, as I understand it, is to see, first of all, that those who need medical attention receive it; second, that lay people are not allowed to dictate to the doctor. The danger of that is perceivable to all. The government should set a high standard of medical ethics. In the maintenance of that standard the medical profession should exert all its rights."

Mr. F. Manley Brist, Saint Paul
Attorney, State Board of Medical Examiners

* * *

"So long as doctors can get money from their practice to live on we know that the poor will be cared for. What we don't know is: what will happen if the doctors can't make a living themselves? It looks to me as though the doctor had already done more than his share and it is time for the federal government to be a little more liberal in the matter of medical treatment for the people who are on relief."

Mr. Forest Wheeler, Saint Paul
SERA

Affiliate Membership

"There are seventy-two men in the State Association who have Affiliate Memberships and forty-seven more have passed the age of seventy and are still continuing to pay dues every year. If we change the age limit to sixty-five there will be an additional sixty-five members who are entitled to become affiliate members, the result in the reduction of income would be $2,500 a year. Can we afford this reduction?"

Dr. L. Sogge, Windom
Councilor

* * *

"If we set the age limit at sixty-five everybody talks and thinks sixty-five. If we set the limit at seventy, the same is true. Why do we have an age limit? I suggest that we eliminate the age qualification and grant affiliate membership at the will of the Council to those who for some reason have ceased or partially ceased to practice, and that we have ethical conduct and high medical standards and a certain number of years of active membership as pre-requisites in each case."

Dr. H. Z. Giffin, Rochester

* * *

"The problem in a large city differs somewhat from that in a rural community. It is inevitable that in cities like St. Paul, Minneapolis, Duluth, we find men, long established, whose income is diminishing though they have not ceased to practice. We would be glad to relieve those men."

Dr. O. J. Campbell, Minneapolis
Secretary, Hennepin County Medical Society

Immunization

"We expect to have an immunization campaign in the spring based on the following plan:

1. All work to be done in the office of the doctor and a fee of $1.00 to be charged (or $1.50 if toxoid is not furnished free by the State Department of Health).
2. All paupers to get free service providing the SERA can find a way to provide toxoid and vaccine.
3. Children can be brought to the doctors' offices by groups in accordance with a set schedule."

Dr. Arnold Larsen, Detroit Lakes

* * *

"Our plan of procedure in this: A notice is sent home with each child and the parents indicate thereon their willingness to have the child immunized or vaccinated as the case may be. The teacher then makes out a data card on each case for our files.

"A charge of 75 cents was made previously for three inoculations of toxin anti-toxin; the charge at present is 50 cents for one inoculation of toxoid.

"Every physician is assigned a room and a helper and the child is sent to the physician designated by the parents.

"I believe this is a good way of doing the work. Inoculation in large groups in the office is likely to be a nuisance. Smallpox vaccination is different, of course, and takes more time."

Dr. T. E. Flinn, Redwood Falls

* * *

"The Social Security Bill now before Congress asks for $10,000,000 to be divided among the states for public health work. By the present arrangement this money will be distributed through the social service workers. This money will be available, probably, for immunization and vaccination on a large scale. Be sure, therefore, that you obtain a fee for what you do.

"Personally I do not believe in school house vaccination. I think the thing to do is to get the pupils to go to the doctors' office."

Dr. H. M. Johnson, Dawson

Medical Economics for Students

"I have thought for a long time that our medical students receive very little training in the business aspects of the practice of medicine; in matters of economics, of investments, of relations with their fellow practitioners. The Alumni Association made a commendable effort to fill the need this year but attendance dwindled because the lectures were not compulsory. I have contacted the University in the hope that such a course can be made a part of the curriculum and subject to examination. It has been done with great success at Marquette University."

Dr. W. A. Coventry, Duluth
President, Minnesota State
Medical Association

Health Insurance

"The Bureau of Medical Economics has studied the entire economic situation of medicine, considering more than 150 plans for various types of medical service ranging from care of the indigent to complete medical service for all. It reiterates the fact that there is no model plan that can be regarded as a cure-all for social ills any more than there is a panacea for the physical ills that affect mankind.

"Your bureau is now ready, however, in accordance with the policy announced in the report of the Reference Committee at the special meeting in Chicago, to advise medical societies in the creation and operation of such plans locally.

"The medical profession is ready and willing to give the American people a complete medical service. I hope that organized medicine and the individuals of organized medicine will take advantage of the opportunities before us."

Dr. R. G. Leland, Chicago
Director, Bureau of Medical
Economics, American Medical
Association

* * *

"It was interesting to note the reaction of the House of Delegates to the New Deal. The bitterest opponent in the House was from the South. A year ago, the same representative hoped that social insurance and the New Deal would remove the burden of care of the negroes. He has found, since, that the negroes are the same burden as they were before."

Dr. C. B. Wright, Minneapolis
Trustee, American Medical
Association

* * *

"Here is a sentence I ran across in a recent popular magazine: 'Paper has never yet refused to receive printing and there comes a time when any plausible lunacy may have the momentary ecstasy of appearing in print.' That sentence applies excellently, I think, to the Epstein Bill."

Mr. Harvey T. Sethman
Executive Secretary, Colorado
State Medical Association

State Legislation

"The legislature as a whole is what we might deem conservative. There is a group in the House that refers to itself as a progressive group. But I don't think it wants legislation that is detrimental to the public health or the welfare of the medical profession. More than 1,500 bills have been introduced into the legislature so far this year.

"A bill requiring physicians to report gunshot wounds has attracted considerable attention. This bill proposed by the Crime Commission would require every physician, surgeon, nurse or hospital manager to report every wound made by a dangerous weapon.

"Other persons who might have knowledge of such wounds were not included in the provisions of the bill and neither was there any provision for keeping the information confidential.

"We opposed the bill for these reasons and because, carried to its logical conclusions, the bill involved several other absurdities.

"If a farmer should cut his foot with an axe, you, as physicians, would have to telephone the sheriff because the wound was made with a dangerous weapon. An automobile has been held to be a deadly weapon, so has a chair.

"Of course, the bill is the aftermath of the Dillinger case. Dr. Clayton May of Minneapolis was convicted in connection with that case, not because he treated Dillinger, but because he harbored a fugitive from justice."

Mr. F. Manley Brist, Saint Paul

Malpractice

"The best preventives against malpractice are: better treatment, better diagnosis, better records.

"The practical physician will protect himself by insurance and the wise one will take heed even if he is insured.

"Be frank with your patients. And always be just to your fellow practitioner.

"Keep up to date. The best way is to belong to your medical society. Arrange for post-graduate work through your own society."

Dr. B. J. Branton, Willmar
Committee on Medical
Economics

Northwest Meeting

Approximately 100 officers committee chairmen, councilors from thirteen states attended the Northwest Medical Conference at the Lowry Hotel in Saint Paul, Sunday, February 24.

Included among the states represented were: Indiana, Michigan, Illinois, Wisconsin, Iowa, North and South Dakota, Montana, Colorado, Nebraska, Missouri, Kansas and Minnesota.

For the first time since organization of the conference by Minnesota Medical Association officials eight years ago, the next conference will be held outside of Saint Paul. It is slated for Chicago and Dr. Oliver J. Fay of Des Moines was elected 1936 president to succeed Dr. Philip H. Kreuscher, Chicago. Dr. E. S. Hamilton, Kankakee, Ill., was elected secretary to succeed Dr. R. L. Parker of Des Moines.

Following are abstracts from some of the important papers and discussions at this meeting:

Suggests "Partial Coverage"

Dr. Gordon F. Harkness (Davenport, Iowa): Compulsory insurance, financially aided by the national or state governments, and thereby controlled by central bureaus, leads to excessive administrative cost, to say nothing of political influences.

Complete health insurance coverage in insurance companies is high, not because the company is avaricious, but rather because their clients have been.

We are confronted with certain facts in this latter type of insurance: lack of actuarial figures, human avarice, lay and medical; the elimination of unnecessary calls for medical services; major illness costs which may not occur for several years; patient's choice of physician; maintenance of the patient's independence; elimination of small medical groups going into the sickness insurance business; maintenance of good medical service within a cost that can be met by the average individual.

In automobile insurance, partial coverage eliminates avarice. Why cannot partial coverage offer something in a practical way as far as sickness costs are concerned? Under normal conditions the ordinary wage earner can meet the expense of minor illness. It is when major illnesses with hospitalization confront him that he may be facing a financial catastrophe.

The kernel of the plan would be this: that before an individual could benefit from his insurance policy, he would have to present receipted bills for medical service up to a certain amount before becoming eligible for major benefits. If hospitalization were included, there would be the same curb. If such a plan is feasible, it demands local responsibility which should be assumed by local county medical organizations.

Medical Legislation

Dr. F. S. Crockett (Lafayette, Ind.): Legislation emanating from the Congress at Washington has not been one of the problems of the medical profession until recently. The probability that the practice of medicine would be controlled through national legislation, such as sickness insurance, seemed quite remote. Nowadays we see that National legislation can also prove a disturbing influence in other ways than through sickness insurance. For example there are income tax rulings, registration fees as those imposed for the control of narcotics, the benefits given ex-service men in the form of free hospitalization, etc.

The threat of national legislation, inimical to the best interests of the medical profession and of scientific medicine, has developed with startling rapidity the last few months. Efforts made to learn the plans of those studying the medical phase of economic security for the Administration have been fruitless. Their attitude appears to justify the belief that they are not in harmony with our ideals, but, on the contrary, are quite determined to make us over to suit themselves.

The disposition on the part of certain department chiefs at Washington to interfere with and regulate and direct nearly everyone and everything seems to be increasingly more evident. The futility of formal protest has been affirmed. We should now make every effort to place before the appropriate committees of Congress and the individual members of both houses, the medical viewpoint.

We must remember that the A. M. A. and its constituent state societies and their component county societies were created and organized as scientific bodies.

Even now, in the midst of repeated and continued threats of socialization and legislation apparently designed to destroy many of the values which make the practice of medicine so desirable, many of our members are loath to desert the idea that we are devoted solely to scientific study. The more realistic of us, however, believe that recognition of conditions as they are and adoption of the corrective principle in harmony with practical experience does not necessarily mean getting into the gutter professionally. There are many proper and recognized ways by which a highly ethical profession can give the administration and congress the benefits of its judgments. We must make some concession to practicality and be prepared to make our influence manifest in the only way understood by those who represent us in Congress.

Local Legislation

Dr. R. L. Sensenich (South Bend, Ind.): The attitude of the individual legislator towards medical questions must obviously be the responsibility of the community from which he comes. Most definitely this responsibility rests upon the local medical society, and more specifically still upon a medical man designated by that society, someone who knows the legislator best, who has his confidence. The Legislative Committee of the American Medical Association is now in the third phase of its so-called contact plan of organization to oppose sickness insurance legislation through direct approach to the lay public. Conferences with political, religious, industrial, Legion and other major groups have been held, and those in high government positions. The present phase is, therefore, to contact the individual citizen in his home through the family doctor. No physician in private practice would remain uninfluenced in his practice or economic situation if sickness insurance were established.

Over-Production of Physicians

Dr. F. J. Savage (Saint Paul, Minn.): While we have less than half as many medical schools as were in existence 25 or 30 years ago, the annual number of graduates is nearly as large as at the peak of the production when there were twice as many schools.

With the benefit of modern transportation facilities, with a widespread system of telephonic communication and with a tremendously larger number of hospitals than were in existence some years ago, the individual physician is able to cover a much greater territory than formerly and is therefore able to give competent service to a much larger group of patients.

There has been a tremendous reduction, also, in the incidence of certain diseases which formerly engaged a very large part of the time and effort of physicians. The improvement in diagnostic methods, too, has operated to decrease the amount of time physicians are required to give certain patients.

Since the medical schools appear to be making no concerted effort to turn out fewer physicians, the responsibility is squarely on the shoulders of the medical profession. With 3,000 deaths per year among physicians and over 5,000 graduates, and the population rapidly approaching a stationary point, in 20 to 30 years, if they are unchecked in the interval, the economic status of physicians will be in jeopardy. Widespread information among physicians along these lines is imperative.

Dr. B. F. Bailey (Lincoln, Nebr.): I fear we are getting on dangerous ground. Can you tell me of any profession that is not overcrowded? We are born independent with ability to do what we can by education and I do not know what we are going to do with these boys. The present, at least, seems to be the wrong time to act. These boys have no employment. I do not know of any way we can control this. Where will they go?

What is "Adequate Care"?

Dr. R. G. Leland (Chicago, Ill.): When we speak of the over-production and under-production of medical facilities and particularly physicians, we are bringing into consideration certain factors which need very careful consideration.

What is adequate medical care? As far as I know that question has never been answered or at least not to the satisfaction of some of us, although the Committee on the Cost of Medical Care published one volume on the subject.

If we are able to arrive at an answer, the next question is: How much more medical care is needed? At the present time there is absolutely no way in which you can get a fairly complete picture of the amount of morbidity which needs to be cared for by the medical profession in the United States and until you have answered these two questions, you cannot answer the question as to how many physicians are needed to take care of that morbidity.

Time Lag

There is still another problem to solve. In the practice of medicine a greater time elapses between the time the person decides to become a doctor and the time he begins to practice medicine than in any other vocation. Put yourself in the place of the young man or woman who, in 1924 or 1925 decided to become a physician. The lag between that time and the time he is permitted to practice medicine, takes him into the depression.

Another fact we must face is whether the tax supported institutions which have medical schools can legally refuse applicants for entrance because of the fact that their parents and families are paying taxes. The question of limitation in private schools might be more easily solved.

The Council Meets

Medicine in State Institutions

Appointment of a committee to make a survey of the quality and extent of medical care in state institutions was suggested by Dr. W. R. Humphrey who made his suggestion in person at the invitation of the Council.

Such a check by responsible physicians will prevent the possibility of unpleasant medical scandals, Dr. Humphrey told the Council.

By a coincidence, the Committee on State Health Relations, Dr. Theodore Sweetser, chairman, has just undertaken a similar survey as part of its 1935 program.

The Council upon being informed of this project, officially approved of the survey, thanked Dr. Humphrey.

Minnesota State Meeting

Members of the Council were informed of the 1935 program policy: all speakers with one possible exception are to be out-of-state men.

Minnesota men will figure prominently in the scientific exhibits and demonstrations—the latter will occupy two hours of program time daily, from 10 to 11 a. m. and from 2 to 3 p. m.

Fifteen distinguished guest speakers have definitely accepted invitations to speak (see program account elsewhere in this issue).

Hobby Show

What do doctors do in their hours of leisure? Some of them lay aside their detective fiction for the wood carver's knife, for paint and plaster, or the camera or the collection of books, firearms or pipes.

An exhibit of these hobbies of Minnesota physicians will be one of the high lights of the 82nd Annual Meeting the Council was told.

Funds raised from sale of exhibit space to commercial firms that supply materials needed in the pursuit of these hobbies can be used to provide an adequate space for treasures and trophies, the Council decided, and proper guards during the three days of the meeting.

Renominated

For the Certification Board for Public Health Nurses the Council renominated Dr. O. E. Locken of Crookston.

Maternal Welfare

A new Committee on Maternal Welfare will be appointed for the State Association, with the approval of the Council. Dr. R. D. Mussey of Rochester will be chairman of the new committee according to President W. A. Coventry of Duluth who was empowered by the Council to appoint the committee. There will be four other members, one each from Minneapolis, Saint Paul and Duluth and one from the rural counties.

Course for Seniors

The proposal of Dr. Coventry that senior medical students receive a compulsory course in medical economics, medical ethics and their legal status and rights was approved by the Council. Dr. Coventry reported that he is now in correspondence with the Dean on the subject.

Such a course was recommended to take the place of a proposed letter to graduating students.

Immunization

The Council cannot lay down any rules regarding immunization campaigns—how they are to be carried out and where, the price to be charged, et cetera. Each county society must decide upon its own policy and make its own rules since the number of physicians participating, the distances, the funds and the ability of the people to pay differ in each community.

Minnesota State Board of Medical Examiners

Out of State Doctor Warned Against Practicing Medicine and Healing

On February 22, 1935, the Minnesota State Board of Medical Examiners issued a warning to Dr. F. C. Vogt, 159 North State Street, Chicago, Illinois, to cease practicing healing in the State of Minnesota without a license.

Dr. Vogt is licensed to practice medicine in the State of Illinois, but has no license in this state. He was conducting a so-called postgraduate class in hernia at the Curtis Hotel in Minneapolis for a so-called tuition fee of ten dollars per doctor. About forty doctors were in attendance from Minnesota, North Dakota and Wisconsin. Persons were treated for hernia and there is no provision in the Medical Act nor the Basic Science Law that excepts Dr. Vogt. Dr. Vogt was not called in consultation by any doctor in this state, nor is he a member of the teaching personnel of the University of Minnesota.

The records in the possession of the Minnesota State Board of Medical Examiners indicate that Dr. Vogt was born in 1881 and holds a diploma from the St. Louis University School of Medicine in 1906. He is not a member of the Chicago Medical Society nor the American Medical Association. Dr. Vogt apparently located in Chicago in 1928 from Gillespie, Illinois. He was associated with an advertising varicose vein treatment concern known as the Viscose Ambulatorium. In February, 1931, he was associated with the Illinois Intravenous Institute. In May, 1931, he was associated with the Vartex Company in a varicose vein treatment. Dr. Vogt is now connected with the Loop Health Center, 159 North State Street, Chicago, Illinois.

Dr. Vogt was informed that if he continued to operate in the State of Minnesota a prosecution would be instituted and the case would be tried out in Court. At first he stated he was called in consultation, but when this was refuted he stated he was merely giving lectures, but finally admitted that people had been injected for hernia. He further stated that rather than have any trouble about the matter he would leave the State at once.

St. Paul Physician's License Revoked For Narcotic Violation

In the Matter of the Revocation of the License of James O. Cavanaugh, M.D.

The license to practice medicine held by Dr. James O. Cavanaugh was revoked on February 9, 1935, by the State Board of Medical Examiners. Dr. Cavanaugh entered a plea of guilty on November 26, 1934, to an indictment charging him with violation of the Harrison Narcotic Law. It was shown that Dr. Cavanaugh had written numerous prescriptions for drug addicts. Following Dr. Cavanaugh's conviction a petition was filed in the Probate Court of Ramsey County to determine whether or not Dr. Cavanaugh was a dangerously insane person. After an examination by two Saint Paul psychiatrists Dr. Cavanaugh was found sane and the petition was dismissed. Dr. Cavanaugh is serving a sentence of a year and a day at the Federal Penitentiary at Leavenworth, Kansas.

List of Physicians Licensed by the Minnesota State Board of Medical Examiners

Feb. 9, 1935

January Examination

By Examination

Alcorn, Kent Achibald, U. of Ill., M.D., 1931, Rochester, Minn.
Arling, Leonard S., U. of Minn., M.B., 1934, Minneapolis, Minn.
Arny, Frederick Phillip, U. of Minn., M.B., 1934, Saint Paul, Minn.
Baird, Lester White, U. of Ill., M.D., 1933, Rochester, Minn.
Barr, Lowell Colvin, U. of Neb., M.D., 1933, Albert Lea, Minn.
Becker, Frederic T., U. of Minn., M.B., 1934, Minneapolis, Minn.
Bedard, Robert Edward, U. of Ill., M.D., 1934, Rochester, Minn.
Butt, Hugh Roland, U. of Va., M.D., 1933, Rochester, Minn.
Coffey, Robert James, Georgetown U., M.D., 1932, Rochester, Minn.
Dietrich, Frank Sigel, Stanford U., M.D., 1934, Rochester, Minn.
Dry, Thomas Jan, U. of Cape Town, Africa, M.B.-Ch.B., 1929, Rochester, Minn.
Foker, Leslie Warren, U. of Minn., M.B., 1933; M.D., 1934; Minneapolis, Minn.
Foster, Frank Pray, McGill U., M.D., 1933, Rochester, Minn.
Freidman, Louis Lawrence, U. of Minn., M.B., 1932; M.D., 1933; Minneapolis, Minn.
Giere, Carl Norman, U. of Minn., M.B., 1934, St. Paul, Minn.
Gunlaugson, Frederick Gunnar, U. of Minn., M.B., 1934, St. Paul, Minn.
Heise, Herbert von Rohr, Jefferson Med. Col., M.D., 1927, Winona, Minn.
Hertzog, Ambrose John, Tulane U., M.D., 1932, Rochester, Minn.
Hutchinson, James Carl, Northwestern U., M.B. and M.D., 1933, Rochester, Minn.
Johnson, Emil Waldemar, U. of Minn., M.B., 1934, Duluth, Minn.
Johnson, Paul Ames, U. of Minn., M.B., 1934, St. Paul, Minn.
Jones, Herbert Maltby, Cornell U., M.D., 1932 Rochester, Minn.
Kaump, Donald Hunter, Washington U., M.D., 1932, Rochester, Minn.
Lundquist, Curt Wallace, U. of Minn., M.B., 1934, Minneapolis, Minn.
McClatchey, Warren Samuel, U. of Neb., M.D., 1933, Red Wing, Minn.
McTamaney, Robt. Anthony, Georgetown U., M.D., 1932, Rochester, Minn.
Mitby, Irvin LeRoy, U. of Minn., M.B., 1934, St. Paul, Minn.
Moberg, Clarence William Rush, Med. Col., M.D., 1934, Minneapolis, Minn.
Nydahl, Malvin John, U. of Minn., M.B., 1934, Minneapolis, Minn.
O'Neal, Buford Lee, Vanderbilt U., M.D., 1932, Rochester, Minn.
Platou, Ralph Victor, U. of Minn., M.B., 1933, Minneapolis, Minn.
Ritchey, Sterling James, U. of Iowa, M.D., 1932, Minneapolis, Minn.
Roemer, Henry Joseph, U. of Minn., M.B., 1934, St. Paul, Minn.
Rogers, Charles Wesley, U. of Minn., M.B., 1934, Duluth, Minn.
Sanford, Hawley Seager, Harvard U., M.D., 1933, Rochester, Minn.
Schade, Frederick Louis, U. of Minn., M.B., 1934, Minneapolis, Minn.
Searles, Paul Wesley, U. of Minn., M.B., 1933; M.D., 1934; Rochester, Minn.
Shoemaker, Rosemary, U. of Pa., M.D., 1933 Rochester, Minn.
Thielen, Robert Dexter, U. of Minn., M.B., 1934, St. Paul, Minn.
Turnbull, Andrew, U. of Manitoba, M.D., 1929, Rochester, Minn.
Walch, Alphonse Edmund, St. Louis U., M.D., 1933, Minneapolis, Minn.

By Reciprocity

Macey, Harry Buford, U. of Tenn., M.D., 1930, Rochester, Minn.

National Board Credentials

Fritzell, Kenneth Edward, U. of Minn., M.B., 1930; M.D., 1931, Minneapolis, Minn.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for April

The Minnesota State Medical Association Morning Health Service.

The Minnesota State Medical Association broadcasts weekly at 10:30 o'clock every Tuesday morning over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month will be as follows:

April 2—Hand Infections.
April 9—Leukemia.
April 16—Ear Infections.
April 23—Hysteria.
April 30—Prenatal Dental Care.

American Association on Mental Deficiency

The annual meeting of the American Association on Mental Deficiency will be held at the Hotel Palmer, Chicago, on April 25, 26, and 27. The Thursday and Friday sessions will be devoted to studies on Mongolism; Birth Injury as an Etiological Factor in Mental Deficiency; Mental Disorders in Mental Deficiency; The Problem of Sterilization; Defective Delinquency and its Relation to Penal Institutions; Community Supervision of the Paroled Mental Defective; and Newer Methods in Institutional Training for Community Life. The Saturday session, on April 27, will be devoted to the sociological, psychological, and the special educational aspects of Mental Deficiency. Physicians are cordially invited to attend these sessions. Complete data on the program may be obtained from the Secretary, Dr. Groves B. Smith, Godfrey, Illinois.

State Association Meeting

With the acceptance of Dr. L. W. Sauer of Chicago to speak at the annual meeting of the Minnesota State Medical Association to be held June 24, 25 and 26 at the Minneapolis Auditorium, arrangements for the Tuesday morning program have been virtually completed.

This meeting will be one of the two joint sessions to be held with the American Association for the Advancement of Science, which will meet during the same week at the University of Minnesota. Dr. Sauer, who will come here under the auspices of the Northwest Pediatrics Society, will give the principal address from 11 to 12 o'clock on this program. He will talk on "Whooping Cough Vaccine."

The hours from 8 to 10 will be devoted to a symposium on blood diseases with three noted physicians of the United States taking part. Dr. William P. Murphy of Harvard Medical School will speak on "Liver Therapy in the Treatment of Anemia"; Dr. T. L. Squier of Milwaukee will talk on "Agranulocytosis," and Dr. W. A. Bloedorn of the United States Public Health Service, Washington, D. C., will discuss "Iron Therapy."

Dr. Murphy with Dr. George Minot, also of Harvard, and Dr. George H. Whipple of the University of Rochester, received the 1934 Nobel Award in Medicine for their work on Liver Therapy in Anemia. Dr. Murphy's appearance on the program will be sponsored by the Hennepin County Medical Society. Drs. Bloedorn and Squier were invited to speak by the American Association for the Advancement of Science.

Dr. Murphy will give a popular address on the Monday night program which will be the other joint session of the two associations. A number of other distinguished medical men are among the speakers for three-day session including Dr. Frank Lahey of Boston, sponsored by the Minneapolis Surgical Society; Dr. Percy Brown of Boston, who will give the Russell D. Carman Memorial lecture; Dr. Harry Alexander, St. Louis; Dr. Edmund Andrews, Chicago, and Dr. Thomas G. Orr of Kansas City. Dr. Richard Pearson Strong, Professor of Tropical Medicine at Harvard, will appear as the guest speaker of the American Association for the Advancement of Science.

Scientific demonstrations and exhibits will play a more important part in this year's meeting than ever before. Definite periods each day will be especially devoted to this section of the program. Two clinics will also be included on the program, one to be conducted by doctors of the Mayo Clinic, Rochester, the other by University of Minnesota physicians.

Hobby Show

A feature of the 1935 meeting is to be a hobby show to include a wide range of exhibits representing the activities of the doctors in their moments of recreation away from their profession.

Hobbies which take the form of art such as painting, sculpturing, photography, wood carving, writing (not medical papers but in a lighter vein), music, gardening, landscaping, even architecture will be included. The sports will be represented: hunting, fishing, riding, golfing, boating, play of any sort.

In addition there will be the collections of various articles, pipes, firearms, trout flies, coins and stamps, antiques and other objects dear to the hearts of men whatever their profession. As a special attraction the Ramsey County Medical Society will be asked to provide an historic medical exhibit.

A special room in the Auditorium, where the entire meeting program will be held, will be devoted to the hobby show, in order that prized collections may be locked up and guarded.

Anyone interested in exhibiting his own particular hobby is urged to communicate with Dr. F. A. Olson of Minneapolis, chairman of exhibits for the Hennepin County Medical Association.

A Course in the Allergic Diseases

A course in the *Allergic Diseases, their Prevention, Diagnosis and Treatment,* offered by the General Extension Division, University of Minnesota, will be taught by Dr. R. V. Ellis of the University of Minnesota Health Service, starting Tuesday, April 2, 1935, at 7:30 p. m. and continuing thereafter for eight weeks. Meetings will be held in room 12 of the Medical Science Building, University Campus. The registration fee of $5.00 should be sent to 402 Administration Building, University Campus, Minneapolis.

Minnesota Dermatological Society

The Minnesota Dermatological Society announces the second annual Vander Horck lecture and clinic. The guest of honor this year will be Professor Franz Blumenthal of Ann Arbor, formerly of Berlin, who will lecture before the University Hospital staff at 12:30 on Thursday, April 18. The subject will be the Paradoxical Influence on the Sun's Rays on Cancer, Causative and Curative." All physicians are invited to attend the lecture.

The Vander Horck meetings were begun last year in commemoration of Dr. Max Vander Horck.

Minneapolis Surgical Society

The annual symposium on cancer of the Minneapolis Surgical Society will be held in the Hennepin County Medical Society Auditorium, Thursday, April 4, 1935, at 8:00 p. m.

I. Dr. Martin Nordland, President
 Announcements and Introduction of Cancer Committee Chairman
II. Dr. Kenneth Bulkley, Chairman
 Introductory Remarks
III. Dr. S. H. Baxter
 Melanoma.
IV. Dr. Martin Nordland
 Malignancy of the Thyroid.
 Discussion by Dr. C. R. Drake (by invitation).
V. Dr. F. A. Olson
 Organization of Hospital Service for Diagnosis and Treatment of Cancer.
VI. Dr. Theodore Sweetser
 Malignancy of the Urinary Tract.
VII. Dr. S. R. Maxeiner
 Carcinoma of the Stomach.
VIII. Dr. J. A. Johnson
 Treatment of Carcinoma of the Rectum by Cautery in Patients of Advanced Age, and Otherwise Poor Surgical Risks.

F. A. Olson, M.D., *Secretary*

Kandiyohi-Swift-Meeker Counties

The March meeting of the Kandiyohi-Swift-Meeker County Medical Society was held March 14 at the Lakeland hotel, Willmar. A discussion of the proceedings of the annual county officers' meeting held in Saint Paul in February was given by the president of the society, Dr. F. W. Behmler, and a number of members who attended the conference.

Rice County

A meeting of the Rice County Medical Society was held in the Faribault Clinic Rooms, Thursday, 7:45 p.m., March 21.

Drs. E. C. Kendall and A. M. Snell, of the Mayo Clinic, spoke on "Endocrine Glands." These gentlemen should be complimented for their wonderful and interesting talk on this subject.

The following resolution was unanimously adopted:

Whereas, It is fitting and proper that outstanding work in any branch of medicine should be appreciated and honored by fellow scientists; and

Whereas, Dr. Adolph M. Hanson, one of the members of the Rice County Medical Society, has for the last ten years done such outstanding work in laboratory investigations, covering the parathyroid, thymus and pineal glands, which work has been highly honored in eastern and western research laboratories;

Therefore be it resolved, That the Rice County Medical Society wishes to express its appreciation of Dr. Hanson's scientific work and to assure him that the society feels itself honored to number him among its members.

Be it further resolved, That these resolutions be spread on the minutes of the society.

C. J. Plonske, *Secretary.*

Stearns-Benton Counties

The relief director was the main speaker of the evening at the meeting of the Stearns-Benton Medical Society at the Breen hotel in St. Cloud, March 28. "Federal Relief" was the subject discussed by Director Whitmore. Dr. R. N. Jones presented a case and movies were shown on "Repair of Urethrocele, Cystocele and Lacerations of Cervix" and "Repair of Second and Third Degree Lacerations of the Perineum and Rectocele."

Wabasha and Winona Counties

There were thirty-four in attendance at the annual dinner and joint meeting of the Wabasha and Winona County Medical Societies held at Buena Vista Sanatorium, Wabasha, on the evening of March 18.

The following program was presented:

Hemorrhage Rubella: Case Report, Dr. D. P. Dempsey, Kellogg.

Pupillary Phenomena, Dr. E. D. Risser, Winona.

Coronary Sclerosis: Diagnosis, Prognosis and Treatment, Dr. A. R. Barnes, Rochester.

Uses of the X-Ray in the Diagnosis of Lesions in the Large Intestine, Dr. H. M. Weber, Rochester.

Our Relations to Present and Proposed Economic Regulations, Dr. W. A. Coventry, Duluth, president of the State Medical Association.

At a special session of the Wabasha County Medical Society held in connection with the above meeting, Dr. Bernard A. Flesche of Lake City and Dr. Hubert T. Sherman of Plainview were elected to membership. The invitation of Dr. R. C. Radabaugh of Hastings, president of the Wabasha County Medical Society, to meet as his guests at Frontenac Inn for the annual meeting in July, was accepted.

PROCEEDINGS *of the* MINNESOTA ACADEMY OF MEDICINE

Meeting of February 13, 1935

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, February 13, 1935. The President, Dr. Alexander Hall, in the Chair.

The meeting was called to order at 8 p. m. There were 50 members and 2 guests present.

Minutes of the January meeting were read and approved.

The scientific program was as follows.

OLEOTHORAX: A REPORT OF ITS USE IN TWENTY CASES

Everett K. Geer, M.D.

Saint Paul

(To appear later in Minnesota Medicine)

Discussion

Dr. F. F. Callahan (Pokegama): I think Dr. Geer has covered the subject of oleothorax very well. The field for this type of treatment is limited and cases must be carefully selected. It should never be given as a primary measure and at least a partial pneumothorax should be present before oil is introduced into the pleural cavity. We have found it valuable in tuberculous pyopneumothorax in the absence of bronchial fistula or when the fistula is small. It is useless or even harmful when a patent broncho-pleural fistula exists. It often closes cavities, stops the expectoration of positive sputum and causes a loss of symptoms of active tuberculosis in cases that cannot be controlled by pneumothorax. Oleothorax frequently obviates the necessity for major chest surgery temporarily and in some cases permanently.

Our first apparently successful case of oleothorax at Pokegama was in a man twenty-five years of age, who was found to have far advanced bilateral tuberculosis in October, 1929. He had rest treatment plus pneumothorax for nineteen months in a sanatorium. Following partial pneumothorax collapse of the left lung he developed a severe left-sided pyopneumothorax. When he came under our care he was very toxic and weighed 109 pounds. His height was six feet. He had, in addition, roentgenological evidence of infiltration and a medium sized cavity in the upper portion of the right upper lobe, a tuberculous lesion in the cecum and a tuberculous ulceration in the interarytenoid space of the larynx. Oleothorax was started in July, 1931. The pus in the left pleural cavity was aspirated and the pleural pocket was washed with normal saline solution. The air was replaced with one per cent gomenol in mineral oil. In two months the pus disappeared from the pleural cavity and all symptoms abated. He was discharged from the sanatorium in March, 1933. His sputum had been negative for one year and his weight was 139 pounds. During the past summer he indulged in fairly strenuous exercise, including swimming and diving. This was against advice. In October, 1934, he developed a tuberculous abscess in the distal end of the ninth rib on the left side, which broke down and formed a fistula. He lost a moderate amount of oil and for the first time in two and a half years he began to raise positive sputum. At the present time his fistula is practically healed, he is holding his oil and the sputum is greatly reduced.

In February, 1932, we admitted a seventeen year old girl with an advanced tuberculosis in the left lung, with cavity formation and a moderately severe diabetes. A partial collapse of the left lung was obtained by pneumothorax. This controlled her expectoration and other symptoms for a short time. Oleothorax was done outside the sanatorium, but was unsuccessful. She was readmitted in November, 1933, the oil was aspirated and a phrenicectomy was done December 2, 1933. A thoracoplasty was contemplated but it was decided to give oleothorax another chance. She left the sanatorium September 29, 1934, and informed me a short time ago that she had not raised sputum since the first week in September, 1934.

Both of these cases may come to major surgery later and, if so, their chances of surviving will be much greater than when they were first seen.

At a recent meeting of the Minnesota Trudeau Society, Dr. A. J. Chesley stated that the death rate from tuberculosis in Minnesota had dropped from 119 plus in 1911 to 38 plus in 1933.

Collapse therapy has undoubtedly played a considerable part in this reduction in the death rate. In addition to the lives directly saved, collapse therapy has diminished materially the incidence of infection. Now many patients return to their homes free from tubercle bacilli who formerly would have been positive as long as they lived. Collapse therapy is cutting down the number of chronic carriers. While oleothorax must play a minor role in collapse therapy it is of great value in many cases.

Dr. S. E. Sweitzer (Minneapolis): I did not understand what kind of oil Dr. Geer uses in these cases, whether it is a mineral oil or vegetable oil. The tissue reactions are different in the two; mineral oil is more likely to give an irritating reaction.

Dr. John F. Noble (Saint Paul): At some time in the future, Dr. Geer and I hope to be able, from experimental data, to answer some of the questions which he has raised regarding oleothorax. At the present time, we have only a small amount of experimental material. In the spring of 1933 we produced an oleothorax in four rabbits using plain paraffin oil in two, paraffin oil with 2 per cent gomenol in one, and paraffin oil plus an oil soluble dye in another. Two of the animals were studied after about a three-week interval, while two were allowed to go for over a year. It was interesting to note that at first the inflammatory cellular reaction was acute in type, though even after only a few weeks high grades of fibrosis were seen in the pleural cavities. The cell reaction in these cases conisted of polymorphonuclear leukocytes, plasma cells, and lymphocytes. In the cases allowed to go longer periods, a peculiar picture was seen. In one animal he entire pleural cavity was replaced by a mass of maerial resembling adult fat tissue with a large amount of connective tissue stroma. Microscopic sections of his tissue showed large globules of the oil to be surrounded by connective tissue bands. The spaces were ined by macrophages which, in some instances, were markedly flattened. At other points the macrophages had definitely phagocytosed small oil globules.

In producing unilateral oleothorax in a rabbit, the oil may leak to the other pleural cavity since the mediastinum is not complete in a rabbit. In one instance where this happened, the lung on the side opposite to the original oleothorax showed, in its parenchyma, a picture similar to that described in aspiration lipoid pneumonia. The alveoli showed numerous giant cells containing phagocytosed oil globules and some of the small arteries were filled with fat. The endothelium of the arteries containing oil was proliferating. We are not ready to offer an explanation of this finding, but it opens an attractive field for investigation.

Dr. Geer and I are going to continue these animal experiments and in the future we may be able to explain more fully some of the questions he has raised.

Dr. Irvine McQuarrie (University of Minnesota): We have made some studies of the blood lipids in epileptic patients because of the fat-like nature of the brain itself. We found incidentally that patients who developed pneumonia and certain other febrile diseases during the course of our study had very markedly reduced plasma cholesterol, lecithin and total fatty acids. We extended the investigation to a variety of infections and found that so long as the patient had a fever the lipids remained low and that with convalescence they returned to higher levels. Patients who finally expired would have persistently low blood lipids. Dr. Stoesser has continued the work and found that the unsaturated fatty acids of the blood are diminished. I wondered, when one administers these oils intrapleurally, if one is not getting something in addition to the mechanical factor by the absorption of the oil. The fat metabolism is tied up very closely with the processes of immunity; and tuberculosis was one of the first diseases in which the plasma cholesterol was found to be very low.

Dr. F. R. Wright (Minneapolis): I wonder whether a man is justified in using experimental therapy on the human being. These cases, I understand, are practically all fatal if left to the ordinary methods of treatment; therefore, one would feel he is justified in trying almost anything. Within the last six months a patient has said to me, "I can replace my money, but life cannot be replaced."

Dr. Geer (in closing): In reply to Dr. Sweitzer's question, I have been using 2 per cent gomenolized paraffin oil for the tuberculous empyema cases. For inhibitory and compression purposes, plain paraffin oil has been used. Although it has been thought from clinical observations that paraffin oil is more irritating to the pleura than olive oil, the experimental notations by Goldenberg and Flanchik point to the opposite conclusion.

I would like to stress most emphatically that this measure along with our other collapse therapy procedures in no sense approaches a panacea for the treatment of pulmonary tuberculosis and its thoracic complications. Oleothorax is to be looked upon as another aid and quite limited in its scope, but definitely helpful when indicated.

THE EFFECTS OF SODIUM AND POTASSIUM SALTS ON CARBOHYDRATE METABOLISM AND BLOOD PRESSURE

Irvine McQuarrie, M.D.
Minneapolis

Abstract

In the course of a preliminary inquiry concerning the cause of the excessive craving for salt which was manifested by one of our severely diabetic boys, it was incidentally discovered that he developed arterial hypertension during periods of high sodium chloride intake. Further study revealed the additional fact that the degree of glycosuria was diminished during such periods. It was, therefore, determined to make a careful investigation of these phenomena under more thoroughly controlled conditions. During the past year Dr. Thompson and I have made repeated observations on four diabetic children and on one non-diabetic control subject with similar results.

Briefly, it has been found in diabetic patients on uniform maintenance diets low in potassium and with insulin dosage adjusted at such a level as to permit a moderate degree of glycosuria throughout the day, that ingestion of from 30 to 80 grams of NaCl daily results in a significant decrease in glucose output (*e.g.*, from 60 to 20 grams daily) and an elevation of both the systolic and diastolic blood pressure. Other sodium salts than the chloride, namely bicarbonate of citrate, have similar but less striking effects. Potassium chloride was found to influence the blood pressure and the carbohydrate metabolism in the reverse direction, causing an increase in the degree of glycosuria and a decrease in blood pressure. Calcium and magnesium salts are also being studied.

The mechanism of these relationships is not as yet understood. That the effect of the NaCl on glucose output is not merely one of retention of glucose along with retained water is shown by the fact that the latter rarely exceeds two kilograms while the extra glucose retained over a period of one week during the high-salt intake may be as much as 350 grams. The total amount retained in the water stored during the period, if calculated on the basis of the blood sugar levels found at the time, would be no more than one per cent of the latter quantity. There is apparently not only better glycogen storage but also more rapid oxidation as indicated by the fact that the respiratory quotient tends to be higher during the high sodium chloride period. The possible relationship of the phenomena discussed to adrenal, pancreatic and pituitary functions is considered.

Discussion

Dr. R. T. LaVake (Minneapolis): The importance of experiments of this type cannot be over-emphasized. It is to be hoped that such experiments will throw a great deal of light on the treatment of toxemias of pregnancy as a by-product. I would like to ask Dr. McQuarrie if he has experimented at all with magnesium sulphate as a neutral salt in this group of experiments. When Martin Fischer was here many years ago, he described his experiments with magnesium sulphate and since that time a great deal has been done in the use of magnesium sulphate in the toxemias of pregnancy, and apparently magnesium sulphate has a tendency to reduce the blood pressure. We put our toxemia patients on a salt-free diet with restricted fluids, a Carrel diet and use magnesium sulphate as a neutral salt.

This work of Dr. McQuarrie's is most interesting and instructive.

Dr. H. L. Ulrich (Minneapolis): I was very much interested in this discussion. I would like to see cholesterol or rather esterol studies made on these patients. Many years ago some work was done on cholesterol as a possible cause of essential hypertension. Experimentally, it has been shown cholesterol increases the irritability of the smooth muscle cells of the body.

I would like to ask Dr. McQuarrie if there was a marked weight increase in these cases?

Dr. McQuarrie: There was an increase of about 2 kilograms in each patient during the high-sodium-chloride periods.

Dr. Ulrich: Intercellular edema can be relieved by withholding salt; intracellular edema can be modified by potassium. The Germans use a term "das wasserhaushalt," or, literally translated, water household of the body which embraces all the water of the body and its physiology. There is a daily tide of water in our bodies amounting to 7 to 10 liters which never leave the body. The physiology of this large movement of water is not entirely clear. Recent experiments in a very accurate metabolism chamber demonstrated that the output of the kidney is controlled by the posterior pituitary. It would be very interesting to know the effects of sodium and potassium ions on the pituitary.

Dr. McQuarrie (in closing): In regard to Dr. LaVake's question, I believe that this is quite an important point of attack in eclampsia, and certainly there is water and salt retention in that condition. Also, Anselimo has shown that there is an increase of pitressin in the blood in eclampsia. I have used magnesium sulphate quite frequently in children with acute glomerular nephritis with arterial hypertension. Its beneficial effect has never been adequately explained on the basis of osmotic effect because we use so little. It is very effective. I believe now that its chief action may be on cell membrane permeability rather than on osmotic action. Potassium apparently antagonizes sodium in some as yet unknown way. Magnesium may have a similar action.

In regard to Dr. Ulrich's question about cholesterol, I can say that cholesterol is a profound narcotic when injected intravenously. Cholesterol mobilizes sodium chloride and water from the tissues into the blood stream from whence it is excreted by way of the kidneys. So one would expect, if these studies hold up, that this would fit in very nicely with what has been said in regard to the effect of cholesterol on blood pressure.

The effect of lecithin, on the other hand, is quite the reverse; it increases irritability and retention of water.

DETACHMENT OF THE RETINA

C. N. Spratt, M.D.
Minneapolis

Since the paper on retinal detachment by Dr. Burch was presented before this Academy, several men have asked me as to the details of the operation. I thought it might be of interest to show moving pictures, as this would convey a much better idea of the procedure than a lengthy description. This patient was struck in the right eye on Thanksgiving day, 1934. About five weeks later he noticed a blurring of his vision. Examination disclosed a tear of the retina. This was distinctly seen and located to be 18 millimeters back from the limbus and 30 degrees above a horizontal line. The vision was slightly affected, being 20/20 minus. The operation shown is the Walker modification of the diathermy method.

The meeting adjourned.

R. T. LaVake, M.D.
Secretary.

Meeting of January 9, 1935

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, January 9, 1935, with the president, Dr. Alexander Hall, in the chair. The meeting was called to order at 8:15.

There were fifty members and two guests present.

This being the occasion for the address of the retiring president, Dr. Hall announced that, with the approval of the members, the reading of the minutes of the previous meeting and other business would be dispensed with. Dr. Wilcox's address followed.

SIDE-VIEW SKETCHES OF PHYSICIANS*

Archa E. Wilcox, M.D.
Minneapolis

The meeting adjourned.

R. T. LaVake, M.D., *Secretary.*

---

*To be published separately.

TRANSACTIONS *of the* MINNEAPOLIS SURGICAL SOCIETY

MEETING OF JANUARY 10, 1935

The President, DR. MARTIN NORDLAND, in the Chair

VISUALIZATION OF THE BILIARY TRACT BY INJECTION OF RADIO-OPAQUE MEDIA POSTOPERATIVELY

N. Logan Leven, M.D.
(By invitation)

In recent years x-ray study of the various systems of the body by means of contrast media has furnished much information of diagnostic value. In addition to the cholecystography by the Graham-Cole method, radio-opaque media may be introduced into the biliary tract by a reflux from the gastro-intestinal tract and by injection of biliary fistulæ or drainage tubes introduced into the biliary tract at operation. This paper briefly presents a study of the latter group.

The first study of the biliary tract by this method was made by Temsey and Patterson in 1922. They injected three-fourths of an ounce of bismuth paste into the external opening of a biliary fistula and demonstrated extensive filling of the liver ducts with an obstruction at the junction of the hepatic and cystic ducts. Their patient had a severe reaction, having pain, fever, and jaundice. After thirty-six hours, the paste began to come out the fistulous tract, bile flowed, and the distress was relieved.

Investigators since then have used various solutions, including sodium iodide, potassium iodide, various iodized and brominated oils, and solutions of thorium dioxide. We have successively used Lipiodol, Neo-Iopax, Neo-Skiodan and Thorotrast. Thorotrast is less viscid than Lipiodol and more radio-opaque than the iodine compounds used in intravenous urography, so that a more accurate filling and good visualization of the biliary tract is obtained by its use.

Technic.—In a patient a week or more post-operative, the study of the biliary tract is made, providing the patient has had no recent chills or fever. Any air in the drainage tube is evacuated with a syringe. Ten cubic centimeters of Thorotrast is allowed to run in by gravity or gentle pressure applied to the piston of the syringe. If the patient complains of pain, the injection should cease. One picture is taken immediately and another in ten minutes to determine the rate of emptying of the duct system.

Complications.—There have been very few instances cited of reactions following this procedure. In our series, one patient noted marked discomfort at the time of injection by gravity of Neo-Iopax into a T-tube. The following day she developed abdominal pain, nausea, vomiting, a temperature up to 103.8° F. and a pulse of 104. By the second day the symptoms had subsided. No reflux of media into the pancreatic duct was visible. On two previous studies this patient had no discomfort or untoward symptoms and on one occasion definite filling of the pancreatic duct was visible.

To the surgeon, visualization of the biliary tract post-operatively or in cases of persistent or recurring biliary fistulæ is of great value.

In cases in which a T-tube has been placed in the common bile duct the patency of the duct may be inferred from indirect evidence.

1. Measurement of the external biliary drainage.
2. Macroscopic and chemical examination of the stool for bile pigments.
3. Disappearance of jaundice.
4. Effect of clamping the tube.
    a. Discomfort.
    b. Increase of jaundice.
    c. Leakage about tube.

These criteria are not always reliable.

Suppression of biliary output due to liver drainage may result in a slow clearing of jaundice, light-colored stools, and only a small quantity of bile drainage. The evidence may also indicate a partial obstruction, the nature of which is not shown.

By means of cholangiography the anatomical and functional state of the biliary tract can be more accurately determined.

Patency of the cystic duct and common duct after cholecystostomy will determine if later intervention is necessary. This is of particular value in those bad risk cases in whom a prolonged exploration of the common bile duct is not warranted at the first operation.

In cases of persistent biliary fistula the cause and location of the obstruction can be quite accurately determined by cholangiography. The findings are of great value in planning subsequent surgical procedures.

Following choledochostomy it is important to know that no common duct obstruction is present before removing the T-tube.

Mirizzi in a reported series of one hundred cases has demonstrated the value of cholangiography, during operation, in determining accurately any existent pathologic condition in the common bile duct such as functional disturbances, stenosing pancreatitis anomalies and stones.

We have studied thirty-two cases post-operatively by this method, having made fifty injections of the biliary tract in all.

Slides were presented showing obstruction of the cystic duct due to stone; obstruction of the common bile duct due to stricture; stenosing pancreatitis; reflux up the pancreatic duct in cases of stricture, spasm at the sphincter and following stimulation of the sphincter by adrenalin injection; stone in the hepatic duct; and a case of congenital absence of the gall bladder.

Conclusions.—This method of study of the biliary tract is valuable in determining:

1. The cause of biliary fistulæ.
2. The patency of the common bile duct and the presence of overlooked stones before removal of drainage tubes.
3. The existence of pathology in the common bile duct at the time of operation.
4. The normal and pathologic physiology of the common bile duct and the significance of reflux into the pancreatic duct.

SUBASTRAGALOID AND TRIPLE ARTHRODESIS

Vernon L. Hart, M.D.
(By invitation)

Arthrodesis or surgical ankylosis of a joint may be applied with the purpose of curing a disease, eliminating pain, correcting deformity and restoring the physiological function of joint stability. Subastragaloid arthrodesis and triple arthrodesis are established surgical procedures and are frequently indicated in the treatment of the following conditions:

1. The talipes, the club feet resulting from
   (a) Infantile paralysis.
   (b) Spastic cerebral paralysis.
   (c) Muscular dystrophies.
   (d) Peripheral nerve injuries.
   (e) Spina bifida.
   (f) Congenital contractures of the foot and ankle.
2. Tuberculosis of the tarsus.
3. Spastic and painful flat foot.
4. Chopart's amputation.
5. Subastragaloid infectious arthritis.
6. Subastragaloid traumatic arthritis.
7. Fractures and dislocations of the tarsus which involve and disorganize the normal architecture of the subastragaloid and calcaneocuboid articulations.

In this very brief paper I wish to consider the application of subastragaloid and triple arthrodesis in the surgical therapy of fractures of the os calcis.

The os calcis is fractured more frequently than any of the other tarsal bones and not infrequently fracture of the body of the os calcis is comminuted and intra-articular. The fracture lines may enter the subastragaloid joint or calcaneo-astragaloid and calcaneo-astragalo-scaphoid joints and the calcaneocuboid articulation. The normal articular mechanism may be disrupted and if not corrected the result may be a painful foot when the patient becomes ambulatory. As a rule, the laboring man suffering with this type of fracture experiences an unusually prolonged period of disability. There is no other industrial fracture of the extremities in which the resultant compensation and period of disability is greater than in this type of fracture of the os calcis.

The pain in the foot may be the result of several factors: (1) spur formations; (2) excess bone beneath and behind the external malleolus; (3) loose bone fragments; and (4) flattening of the arch of the foot. The most important factor, however, is the presence of traumatic arthritis of the subastragaloid and calcaneocuboid articulations.

Weight bearing upon rough and uneven surfaces causes the patient greater pain than weight bearing upon a flat smooth surface. This is explained by the fact that the function of the subastragaloid and calcaneocuboid joints is to accommodate the foot to uneven surfaces when standing, walking or running. Weight bearing upon a perfectly flat surface involves the movements of plantar and dorsal flexion which are functions of the ankle joint. There are no lateral movements within the normal ankle joint. Weight bearing upon an uneven surface brings into play the various lateral movements of the foot which are functions of the subastragaloid and calcaneocuboid joints. Traumatic arthritis and adhesions involving these joints result in the loss of their functions or pain and disability of the foot with weight bearing upon rough and uneven surfaces.

The several lateral movements of the foot are adduction and abduction, inversion and eversion, supination and pronation. For all practical purposes these terms are synonymous since the movements of the foot around the longitudional and the perpendicular axes do not occur independently but are combined.

Not infrequently this type of fracture may result in a serviceable and painless weight bearing foot even when the deformity was not reduced. Many patients with persistent pain and disability may be relieved by various alterations of the shoe and arch supports. For these reasons I do not recommend immediate subastragaloid or triple arthrodesis in comminuted intra-articular fractures of the body of the os calcis.

In the old fractures of the body of the os calcis, complicated with traumatic arthritis of the calcaneocuboid and subastragaloid joints and painful weight bearing, arthodesis of the affected joints is definitely indicated if the pain can not be entirely relieved by more conservative measures.

THE TREATMENT OF SOME TYPES OF ARTERIO-VENOUS ANEURYSMS AND CAVERNOUS HEMANGIOMAS

William T. Peyton, M.D.

A case of traumatic carotid-cavernous aneurysm (pulsating exophthalmos) is reported which was successfully treated by the procedure suggested by Barney Brooks, namely, putting strips of muscle in the internal carotid artery of the ipsolateral side to occlude the fistulous opening by means of this artificial embolus.

Sinus pericranii (Stromeyer) or cavernous hemangioma of the scalp communicating with the dural sinuses through large defects in the skull was discussed and a case presented which had been treated by injections of sodium morrhuate solution and pressure. A satisfactory result was obtained.

Cases of cirsoid (arterio venous) aneurysm of the scalp and cavernous hemangioma of the lip were presented.

CURRENT EVENTS IN ANESTHESIA

Ralph T. Knight, M.D.

The Horace Wells Memorial Congress of Anesthetists took place in Boston, October 15 to 19. It was opened by a memorial address by Charles J. Wells, head of the Department of Anesthesia, University of Syracuse, and president of the Associated Anesthetists of the United States and Canada.

During the Congress we were also shown a moving picture of the first public administration of ether by Morton. Some of you have probably seen this film at the Century of Progress. Our view of it was made doubly interesting by the fact that on the anniversary of the date, October 16, 1846, we sat in the very amphitheater, the old Ether Dome, of the Massachusetts General Hospital where Morton anesthetized his first patient and where the staff of the Massachusetts General Hospital reenacted the event for the film.

W. Chalmers-Francis, M.D., anesthetist of Los Angeles, presented "Some Medico-legal Aspects of the Nursing Anesthesia Problem."

William Temple, Jr., M.D., of Boston, described "The Boston Anesthesia Service." This is a group of seven or eight physician anesthetists, who, though not practicing in partnership, have a combined twenty-four telephone service at a central office where their appointments are made. They also rotate in remaining immediately available evenings, nights, and holidays.

The scientific program contained many interesting papers.

Mr. W. Etherington-Wilson of Torquay, Devon, England, gave his technic of spinal anesthesia. He has experimented with glass tubes containing fluid of specific gravity equal to spinal fluid. Into these he has injected lighter fluid (percaine solution sp. g. 1.003 of a different color) with the tubes in all manner of different positions. He has found that in the vertical position the diffusion and mixing is most constant and even, and raises a given distance in a dependably constant length of time. Clinically, for low abdominal anesthesia he injects 8 to 10 c.c., waits twenty-five seconds in the vertical position, and tips the patient quickly prone with head ten degrees low. For medium abdominal he injects 10 to 12 c.c. and waits thirty-five seconds. For high abdominal he injects 12 to 14 c.c. and waits forty-five seconds. He had done only eighty-five clinical cases, but Ronald Jarman, an anesthetist of London who was also present, reported in discussion 500 cases which he had done by the essayist's technic with very satisfactory results.

Professor A. M. Dogliotti of Torino, Italy, reported his work in relieving intractable pain by intraspinal injection of absolute alcohol. He places the patient on the side, with the affected side up, turned slightly forward to bring the posterior roots uppermost, and injects at the level of the nerve or nerves from the painful area. A subaracnoid injection of the alcohol is slowly made using 0.3 c.c. if in the cervical or thoracic region, and 0.5 c.c. to 1 c.c. if in the lumbar or sacral region.

Professor William B. McNider of the University of North Carolina gave a paper on the Susceptibility and the Resistance of Tissue Cells to General Anesthetics, especially Ether and Chloroform." He showed that senile kidneys contain more lipoid material in the convoluted tubule cells and in the endothelial cells of the glomerular capsule than is contained in youthful cells. They are therefore more easily anesthetized and even necrosed by ether and chloroform. If the kidneys are first suffused by alkali or by glucose they are changed to approach youthful cells and are not so subject to damage by the anesthetic. The same applies to liver cells. Starvation as well as increased lipoid content increases their susceptibility to anesthesia and necrosis. If the central cells of the lobule are necrosed they are replaced by new atypical cells which are not as susceptible to repeated anesthesia.

I. S. Ravdin and Samuel Goldschmidt of the University of Pennsylvania showed in their paper that an abundance of oxygen had much the same effect as alkalinization and glucose in the prevention of liver damage.

A paper on "Intravenous Evipan Anesthesia" was given by Ronald Jarman and A. Lawrence Abel of London. They reported several hundred cases, stressing the importance of a pause of fifteen to thirty seconds after injecting half of the computed dose. This is because doses computed by weight are not entirely reliable as to susceptibility. The dose is about 100 mgs. per 20 pounds of patient. Anesthesia lasts fifteen to twenty-five minutes.

Frederick A. Coller, Professor of Surgery, University of Michigan, read a paper on "Studies in Water Requirements of Surgical Patients." He had estimated the water loss through perspiration on the operating table and during the recovery period and pleaded for lighter covering.

A presentation of divinyl ether was given by Wesley Bourne, Department of Pharmacology, McGill University. This substance is a liquid given by inhalation. It is very rapid and powerful but non-toxic. It may be given on the open mask but is used best with oxygen.

A further report on cyclopropane was given by Irwin R. Schmidt, Professor of Surgery, and Ralph M. Waters, Professor of Anesthesia, University of Wisconsin. They had used it in 2500 cases and stated that it has now in their clinic practically supplanted ethylene and largely supplanted ether. Its record in operative mortality and post-operative complications is favorable compared with other anesthetics.

Gold and Gold of Cornell University Medical School again reported their investigation of the deterioration of ether after opening, and their conclusion that the deterioration is usually slow and the incidence small. They suggest the use of U.S.P. ether out of large drums, the ether to be tested daily before use.

I do not know how much evipan, or evipal as it is named in America, is being used in Minneapolis. I have used it three times on one patient, all at the Minneapolis General Hospital, each time for fulguration of a small carcinoma in the lower third of the esophagus. The anesthesia was prolonged each time to over half an hour by repeated fractional injections. It was very satisfactory.

We have used no divinyl ether.

We have been using bulk U.S.P. ether at both hospitals since September and it has proved very satisfactory. It gives us newly tested ether daily at a reduced cost, both of which are worth-while advantages.

I have given about 75 cyclopropane anesthesias. One was for resection of the pancreas and splenectomy by Dr. Wangensteen, providing a perfectly satisfactory anesthesia. Two of my early cases were gallbladders for which I had to supplement with half an ounce of ether. Other gallbladders since then have not required ether. Most of the cases have been gynecological operations, and for this group at least, I consider cyclopropane the most ideal anesthetic at present available.

VARIATIONS IN THE TECHNIC OF THORACOPLASTY

Herbert A. Carlson, M.D.

(By invitation)

Thoracoplasty is performed for one of three reasons: (1) to collapse the lung in the treatment of pulmonary disease; (2) to permit closure and healing of a chronic empyema cavity; or (3) to correct a deformity of the bony thorax. At the present time the operation is most commonly employed as a form of collapse therapy in the treatment of pulmonary tuberculosis.

The early Brauer-Friedrich operation, in which the entire lengths of the second to tenth ribs were resected in one stage, proved to be too severe and it led to a great deal of chest wall flapping.

The Wilms-Sauerbruch thoracoplasty was based upon the sound principle of resecting the paravertebral segments of the ribs, thus obtaining a maixmum collapse for the rib lengths removed. This principle is true because: (1) the paravertebral segment has the greater convexity; (2) the more pliable costal cartilage anteriorly permits the rib to swing inward towards the vertebral column; and (3) most of the cavities are situated posteriorly.

The paravertebral resection of ribs has led to satisfactory results in many cases. However, it has been recognized in recent years that failures in the treatment of pulmonary tuberculosis by thoracoplasty have usually been due to inadequate collapse of large or rigid walled cavities. The recognition of this fact has led to modification of the technic of thoracoplasty.

In order to remove long segments of ribs it is wise to perform the operation in three or more stages (illustration by films). A paravertebral thoracoplasty may be supplemented by an anterolateral stage consisting of the resection of the anterior rib stumps together with the costal cartilage through an axillary incision (illustration by films).

During the past few years O'Brien of Detroit has advocated complete excision of the upper three ribs as the first stage of thoracoplasty. Other stages can be carried out subsequently as indicated. Even this procedure may apparently be inadequate in some cases as the costal cartilages remain.

Eden and Robinson, and Wilms have recommended a procedure in which posterior thoracoplasty is combined with resection of small segments of the costal cartilages in order to increase the collapse. This operation appears to be sound but has never become popular.

In this hospital we have recently employed a method which was first suggested by Dr. Wangensteen. In this type of thoracoplasty the costal cartilages and anterior extremities of the cartilages are resected as a preliminary procedure through two short, horizontal incisions. Usually the second to the fifth ribs are resected under local anesthesia. Very little pulmonary collapse results and there is little post-operative reaction. About one week later an upper stage posterior thoracoplasty is performed, the entire lengths of the upper three ribs being resected from the transverse process to the point of previous resection. The resection of the long rib segments is greatly facilitated by the preliminary anterior costo-chondrectomy. Subsequently complete excisions of the other divided ribs may be performed and further resections may be continued as indicated. (Illustrated by films.)

When extensive resections are required this method is rivalled only by paravertebral resection combined with anterolateral thoracoplasty. It has the advantage that the preliminary anterior chondrectomy is a minor procedure compared with anterolateral thoracoplasty.

Films are also shown to illustrate Schede thoracoplasty in the treatment of chronic empyema. Failures in these cases are often due to inadequate unroofing. The best results are obtained if the cavity is completely saucerized.

LITHOLAPAXY

C. D. Creevy, M.D.

(By invitation)

It is the economy and usefulness of litholapaxy, not its novelty, which prompt me to discuss it here tonight. The idea of crushing stones with an instrument inserted through the urethra occurred to surgeons very early, since it is known to have been attempted in the ninth and sixteenth centuries. It was tried only sporadically until the days of Civiale, who first carried it to a successful conclusion in 1824, and subsequently reported twelve other successful cases. He used a folding claw to grasp the stone through which a hole was then drilled by a conical rod. The stone was then broken by striking the rod with a hammer. The patient was then allowed to void the fragments spontaneously.

Sir Henry Thompson devised the first modern instrument with a male and fenestrated female blade and a screw handle with a lock, from which subsequent instruments have changed but little, except for the addition of telescopes and lights to some of those designed to crush small stones.

The operation was associated with a fairly high mortality until Bigelow of Boston in 1878 decided that the bad results were due, not to the crushing of the stone, but to the trauma to the bladder from the sharp fragments, inflicted during subsequent micturition. He designed his evacuator and was the first to crush a stone and remove it at one sitting.

The present day operation is essentially unchanged. The Keyes lithotrite, for large stones, is much like the Bigelow instrument, and is adapted to stones up to two inches in diameter. It is not recommended for larger stones unless unusually soft, since the operation is likely to be too prolonged. Occasionally a stone too hard to crush will be encountered. The Ravich cystoscopic lithotrite is useful for small calculi which may be crushed quickly under direct vision.

Other than excessive size of the stone, there are but few contraindications to litholapaxy. Among these are: (1) severe and active infections such as would interdict any intravesical manipulation; (2) a very large prostate which bleeds freely on manipulation, or a very small bladder which affords insufficient room for the instrument; (3) inability to insert the instrument; (4) the presence of multiple diverticula into which fragments may fall and defy removal, or in which the original stone is lodged; and (5) the presence of a large hard foreign body as a nucleus in the stone.

The technic is simple, if somewhat tedious. The instrument is introduced like a sound after the injection of a small amount (100 to 150 c.c.) of water into the bladder. The blades are turned up, opened, and the base of the bladder depressed so that the stone rolls into the jaws, which are then locked; the stone is crushed by turning the handle. This is repeated until no large fragments are found. The lithotrite is then replaced by a cannula or large cystoscope and the fragments evacuated by alternate injection and suction with the evacuator, or with a syringe. Cystoscopy is then done to determine whether all fragments have been removed, and a catheter is tied in for a day or two. The obstructing prostate may be dealt with by transurethral resection at the same sitting if the stones are small; if the litholapaxy has been long, this is better deferred. In many instances the history will indicate that the stones originated in the upper urinary tract and were held in the bladder by a slightly enlarged or contracted gland. In such cases one need remove only the stone.

In the University Hospital from January, 1933, to January, 1935, litholapaxy has been performed twenty-seven times while suprapubic lithotomy was employed but five times. Litholapaxy was combined with other procedures, chiefly transurethral resection, in eighteen cases, and constituted the only operation in nine. The post-operative hospital stay averaged nine days in the whole group, and 4.2 days after litholapaxy alone. When one considers that the minimum period of hospitalization after suprapubic lithotomy is about ten, and the average twenty-one days or more, the advantage of the method is at once apparent. Employed in conjunction with transurethral resection when necessary, it has the same advantages over the suprapubic operation that resection holds over prostatectomy. It is tending to replace open operation just as resection is, the latter having been used here in 251 of 263 cases (95 per cent) in the past two years. The net result is, I believe, a distinct boon to elderly men.

BIOLOGICAL PHENOMENA IN HODGKIN'S DISEASE

Melville H. Manson, M.D.
(By invitation)

At the present time the etiology of Hodgkin's disease is unkown, but since the latter part of the last century a host of etiological suspects have been investigated. Although there is much conflicting evidence and the matter is not settled, it is generally believed that the tubercle bacillus, originally believed by Sternberg to be responsible for Hodgkin's disease, the various mycoses, spirochetes, and the gamut of diptheroid bacilli which have been variously incriminated are not the responsible agents. Recently M. H. Gordon, consulting bacteriologist of St. Bartholomew's hospital in London, has made a very thorough and systematic search for an etiological agent or agents including spirochets, tubercle bacilli, various moulds and yeasts (some of which were found to produce gramulomatous lesions in animals but differing from Hodgkin's histologically), and finally has searched for a virus.

Time will not permit an account of Gordon's reasons for suspecting a virus or a recital of his interesting investigations. Briefly his procedure and results are as follows: Lymph nodes were taken from patients by biopsy or aseptically at post mortem examinations and transferred to the laboratory in sterile containers, placed in sterile Petri dishes and sliced. One piece was dropped into fixing fluids for histological examination, while the remainder was ground in a sterile mortar. Part of the mince was diluted in sterile water, saline or broth, and placed in a refrigerator. After several days the 0.5 c.c. of the node suspension was injected intracerebrally and intravenously into rabbits. This interval of refrigeration is not readily explainable but it was discovered accidentally by Gordon that such preparations were pathogenic whereas fresh suspensions were not.

After an average incubation period of about four days the injected rabbit shows encephalitis-like symptoms consisting of ataxia, paresis, or paralysis of the hind legs, opisthotonus, often mystagmus and a marked loss of weight. Such a syndrome has been called a positive Gordon's test for Hodgkin's disease. Gordon demonstrated the presence of the pathological agent in nineteen out of twenty cases of Hodgkin's, while nodes from forty-three control cases prepared in the same manner were all negative. These control cases included leucemia, sarcoma, tuberculosis, simple hyperplasia, carcinoma, melanoma, lymphosarcoma, normal gland, etc. Van Rooyan, a student of Gordon's, has tested material from twenty cases of Hodgkin's disease and found fifteen of these (75 per cent) to give positive Gordon's tests. None of his twelve control glands gave positive tests.

It was believed that this work was important enough to investigate, both because of the aid that the test might offer in the cases often encountered where an exact differential diagnosis by microscopic examination is difficult and because of the information that might be gained in exposing an etiological agent. My part in this investigation thus far has consisted largely of following the clinical aspects of the patients and procuring some of the material, the great majority of the work having been done by Dr. Byron Olson and Miss Hazel Dunlap of the Department of Bacteriology.

The technic employed was exactly the same as that used by Gordon and Van Rooyan. All nodes or other material were cultured aërobically and anerobically prior to inoculation into the animals. Cultures were also made of heart blood, spleen, brain, and in some instances of the liver of all killed animals and were quite uniformly negative. Microscopic sections have been made of the brain, lymph nodes, and spleen of some of the animals which showed positive reactions to the injection of Hodgkin's material, and show no significant pathological change.

The reaction in rabbits as we have observed them may be divided into an acute stage, as described by Gordon, with encephalitis-like symptoms, and a more chronic form in which the most marked symptom is cachexia and weight loss. The incubation period in the acute form is from one to six days, averaging 3.5 days. In the chronic form the incubation period averages 21 days (18.30). The average weight loss in all positive rabbits was 615 grams, while the control rabbits averaged a gain of 482 grams in weight.

Results.—(Chart I.) Material from thirty-five patients has been examined, of which number fifteen were Hodgkin's and twenty represent a variety of unrelated pathological and normal lymph nodes or other tissue including tuberculosis, simple hyperplasia, leukemia, benign lymphadenoisis, lymphosarcoma, metastatic adenocarcinoma, fibrosarcoma, lymphoepitheloma, and a node from a case of mesenteric lymphadenitis.

The nodes from the fifteen Hodgkin's cases gave nine positive Gordon's reactions in rabbits. Six revealed no pathogenicity. Thus it is evident that the procedure cannot serve as a specific or even a reliable test in the diagnosis of Hodgkin's disease. The pathological diagnosis of Hodgkin's disease in the majority of our cases was made by Dr. Bell, who also examined several other slides concerning which there was some question as to interpretation.

When six negative Gordon reactions were obtained from unquestioned Hodgkin's material as determined by microscopic examination, it was thought that perhaps x-ray treatment might have influenced the pathogenic agent. As noted in the table the material from the four treated cases gave three negative Gordon reactions and one positive. This might lead one to suspect that x-ray treatment in vivo diminishes the virulence or destroys the pathogenic agent. Van Rooyan treated Hodgkin's material which gave positive rabbit reaction with ten skin unit doses of x-ray and found that the pathogenicity was not influenced. It is possible that x-ray treatments in vitia and in vivo have a different effect on the tissue.

CHART I

Type of material	Gordon positive cases	Gordon negative cases
Untreated Hodgkin's disease	8	3
Treated Hodgkin's disease	1	3
Tuberculosis	2	4
Hyperplasia	1	2
Leukemia	..	1

Other tissues and nodes in the control series included lymphosarcoma, metastatic squamous cell carcinoma, metastatic adenocarcinoma, fibrosarcoma, lymphoepithelioma, mesenteric adenitis, and normal lymph nodes. All (9 cases) were negative.

Total number of cases	Gordon positive		Gordon negative	
	cases	per cent	cases	per cent
Hodgkin's disease—15	9	60	6	40
Controls—20	3	15	17	85

Transmission experiments using brain, lymph nodes, and serum from positive rabbits were all unsuccessful.

Immunity experiments, both passive and active, were all negative.

Extraction of Hodgkin's material by Friedmann's method gave positive results on intracerebral innoculation into rabbits.

Of more importance to the estimation of Gordon's test as a diagnostic procedure is the fact that two definitely positive tests were secured with nodes from two cases of tuberculosis and one from a case of simple hyperplasia of the gland. Thus 15 per cent of the controls gave positive Gordon's tests.

Transmission experiments were done in several instances, using brain suspensions, lymph nodes, and spleen from rabbits with the encephalitic-syndrome, but always with negative results. A few experiments have been done in an attempt to establish an immunity in a rabbit to the pathogenic agent. No immunity is evident in recovered rabbits nor can an immunity be established thus far.

The pathogenic agent described by Gordon and his associates is assumed to be a filterable virus, although to date Gordon has been unable to demonstrate pathogenicity in filtrates of the node suspensions. Van Rooyan, by regulating the pH of his filters has succeeded in obtaining a pathogenic filtrate. Of some interest in connection with the nature of the pathogenic agent, is the report of Friedmann, in 1932, in which he describes a pathogenic agent in normal bone marrow, spleen, and leukocytes, that will produce the same reaction when injected intra-cerebrally into rabbits. This agent is, according to Friedmann, a proteolytic ferment. We have prepared an extract of Hodgkin's nodes according to Friedmann's methods and observed pathogenicity comparable to that observed with suspensions of the nodes. As the preparation of the extract necessitates extraction with acetone, precipitation and washing with absolute alcohol and ether, mixing with glycerine and further exposure to alcohol and ether, it hardly seems probable that the pathogenic agent could be a filterable virus. This is the first time to our knowledge that Hodgkin's material has been so prepared for, animal inoculation.

Discussion.—Until a larger amount of material has been subjected to further experimentation it would not be justifiable to conclude that the phenomena reported by Gordon is of no significance. We believe that the test is not specific for Hodgkin's disease and that the pathogenic agent present is not a living organism. This work is incomplete at the present time but of sufficient interest to justify its continuation. Of particular interest will be a follow-up of the patients whose lymph nodes gave what we believe to be false positive reactions and those cases which we believe to be Hodgkin's whose nodes gave negative Gordon's reactions.

THE SURGERY OF HYPERINSULINISM

Owen H. Wangensteen, M.D.

Our knowledge of the functions and diseases of the pancreas has been elaborated by a process of slow growth. Claude Bernard established the significance of the pancreatic secretions in digestion in 1856. In 1889, v. Mering and Minkowski excised the pancreas in dogs and fixed attention upon the intimate relationship between diabetes and pancreatic disturbance. It was not until 1922, however, when Banting and his associates isolated the internal secretion of the pancreas that speculation concerning the function of the islands of Langerhans, described by him in 1869, was finally settled. This epoch-making discovery fathered the thought that hyper as well as hypo fuction of this activity of the gland may exist. The symptoms attending an occasional exceeding of the physiologic requirements of a diabetic for insulin revealed what the signs of hypoglycemia were, and occasioned Seale Harris, in 1924, to predict the spontaneous occurrence of hyperinsulinism. In 1928, Wilder and his associates at the Mayo Clinic recovered insulin from the tumor tissue of a metastasizing neoplasm of the pancreas. In 1929, Howland and his associates at Toronto reported the first excision of an insulogenic tumor from a patient with hypoglycemia with complete alleviation of the symptoms. In the few intervening years which have since elapsed, a number of such patients have been seen and successfully operated upon. Graham writes in a recent paper that five patients have been relieved of the complaints of hypoglycemia by excision of a tumor of the pancreas at the Barnes Hospital alone.

One cannot help but remark how blind we were to this disturbance which we may now all recognize since our eyes have been opened by those "who went out not knowing whither they went." It is easy to follow a blazed trail well marked with sign posts. These small adenomas of the pancreas have long been well-known to pathologists, and clinical bloodsugar determinations have been made for more than twenty years, yet clarification of the rôle of these small tumors in the causation of convulsive seizures awaited the assimilation of new-found facts. Dr. William J. Mayo has well said that a new fact may change the entire complexion of a problem. To how many other problems are we still blind that lie at our very elbows awaiting the proper range of vision for their solution?

Three patients with hypoglycemia have come under the writer's observation and have been operated upon at the University Hospital. In two, insulogenic tumors were removed with return of the blood-sugar to normal values and relief of symptoms. In the third no tumor was found and re-exploration is contemplated. One patient with established and another with possible hyperinsulinism have also been observed at the hospital. One, a male of forty-five years, came in January, 1931, complaining of weakness and spells of unconsciousness which were interpreted as idiopathic epilepsy. This patient subsequently went to the Mayo Clinic where the nature of his illness was correctly identified; an adenoma was removed from his pancreas by Dr. Judd, who reported the patient as well in 1933. The other was a woman of forty years admitted with a perforated duodenal ulcer, who died of peritonitis five days later. In her rather brief convalescent period, she occasionally complained of hunger sensations. At postmortem, in addition to peritonitis, an oval, reddish-yellow tumor well encapsulated, measuring 5.5 centimeters in diameter, was found. In the middle of the liver a metastatic nodule one centimeter in diameter was found possessing the same histologic appearance as the tumor in the pancreas which was interpreted as a carcinoma of the pancreatic islets. Unfortunately no blood-sugar determinations were made. No convulsive seizures had ever been suffered by the patient.

The histories of the three patients submitted to operation are so illustrative of the symptoms and findings common to patients with hyperinsulinism as to merit brief relation.

1. Mr. P. H., aged twenty-eight years, hospital number 625929, was admitted March 22, 1934, with the complaint of spells of weakness since May, 1934, and convulsive seizures and periods of unconsciousness dating from February, 1931. He soon learned that eating tended to relieve the spells of weakness and forestall the convulsive seizures. Prior to July, 1933, the convulsive seizures and periods of unconsciousness were relatively infrequent. Since then, despite frequent taking of food, these seizures have occurred once or twice a day. The physical examination was essentially negative. The blood pressure was 135/70.

Examination of the blood and urine revealed no abnormal findings. Four fasting blood-sugars at various times after admission gave the following findings: 15.5, 21.5, 23.0 and 40.0 milligrams of sugar per 100 cubic centimeters of blood. Blood-sugar determinations made during attacks of unconsciousness varied between 15 and 50 milligrams. The sugar tolerance was as follows: fasting blood-sugar 46 milligrams, at one-half hour intervals afterward; 154, 186, 210, 260. There was no sugar in the urine at any time following the test.

Under cyclopropane anesthesia exploration of the abdomen was done April 30, 1934. A small tumor located on the dorsal surface of the pancreas in its distal third was felt. Because of the difficulty of getting at it, the tail of the pancreas including the tumor was excised. The wound was closed without drainage; the patient made what appeared to be an uneventful convalescence, but returned later with slight fever and presented tenderness below the left costal margin. A diagnosis of subphrenic abscess, probably small, was made, as inferred from the shadow observed on a radiogram after inflation of the stomach and colon with air. Under conservative treatment alone it cleared up and the patient has remained well. There have been no further convulsive seizures and blood-sugar determinations have shown consistently normal values. The tumor was roughly spherical and measured twelve millimeters in diameter. It was reddish-purple in color and was identified histologically as an adenoma of the pancreatic islets.

2. Mrs. L. W., aged 37, hospital number 630202, was admitted to the neurological service on August 14, 1934, with the complaints of weakness and convulsions. The patient was admitted to hospital during a convulsive seizure. There were clonic and tonic contractions accompanied by carpopedal spasms. The blood-sugar was found to be 30 milligrams per cent. Intravenous glucose solution was administered and the patient was aroused from a semi-stupor at once. These spells commenced about a year ago, and the patient's husband had learned that the oral ingestion of orange juice helped to awaken her.

The weakness had been so extreme that she had been confined to her bed. There had been complete disorientation and confusion. Her conversation had been unintelligible, and patient had been incontinent. The appetite had always been good.

Two years ago a subtotal thyroidectomy was done elsewhere for an adenomatous goiter without hyperthyroidism. The past history otherwise has no bearing on the present complaint.

Apart from the obviously impaired mental status, the notable physical findings were: (1) moderate emaciation; (2) a persistent adenomatous nodule in the right lobe of the thyroid. The blood pressure was 112/80. Fasting blood-sugars varied between 31 and 66 milligrams per cent. On October 14, 1934, the patient was transferred to the surgical service. Operation under ether anesthesia disclosed a small, reddish-yellow, unencapsulated tumor on the superior and ventral aspect of the pancreas. A frozen section made during the course of the operation was interpreted as a low-grade adenocarcinoma. In view of this absence of encapsulation and the histologic findings, a resection of a considerable portion (three-fifths to two-thirds) of the pancreas was done. The omentum was carefully sutured over the site of amputation of the pancreas, and a soft, rubber drain was led out through a stab wound. The convalescence was without marked reaction and the patient was retransferred to the neurologic service ten days later.

There have been no recurrences of the convulsive seizures and the patient has steadily improved. The blood-sugars have been consistently normal since operation. Dr. Bowman, who prescribed for her daily wants once made the naive observation that her conversation in the post-operative period was about equally divided between calling for "Daddy" and "potatoes." When recently admitted for a few days' observation she could carry on an intelligent conversation. She was again fully continent of urine and feces and her strength had improved to the extent that she could sit up unaided.

3. Mr. F. M., aged twenty-nine, hospital number 623663, was first admitted to the University Hospital on January 7, 1934, with the complaints of attacks of weakness, perspiration, and increased irritability, with periods of unconsciousness. The patient has had an obvious acromegaly of several years' standing. The first convulsive seizure occurred in April, 1933, and the patient was taken to Rochester, Minnesota, in an unconscious state. The blood-sugar was 46 milligrams per cent. The patient promptly regained consciousness following intravenous administration of glucose solution. The patient was tried out on a regime of frequent feeding but returned for exploration of the pancreas at a later date. This operation was done by Dr. Judd on June 21, 1933. There were no abnormal gross findings in the pancreas. A portion of the tail of the organ was excised but was found to be normal on histologic study. Following his dismissal the patient gained forty pounds in weight with frequent feedings, but weakness and convulsive seizures still persisted.

On admission to the University Hospital early in 1934, because of the obvious acromegaly as indicated by the large hands and feet, prominent supraorbital ridges and large nose together with tufting of the distal phalanges (though the sella was normal), cross-fire x-ray treatments were applied to the hypophysis but without evidence of improvement after the elapse of several months.

He was again admitted in the summer of 1934 and at the request of the Medical Service exploration of the pancreas was done July 23, 1934. Dr. Russell Wilder of the Mayo Clinic who had seen the patient meanwhile, had suggested that a small tumor previously not demonstrated might now have grown to palpable size. A thorough exploration was carried out and the pancreas was freed up wherever possible to permit of palpating the organ on both superior and inferior surfaces. No abnormalities could be made out. In the process of exploring the pancreas, the organ was fairly well separated from its bed of adventitious tissue.

After operation until the time of dismissal on August 10, 1934, the blood-sugar did not fall below 74 milligrams per cent and there was no recurrence of hypoglycemic attacks. On August 29, five weeks after the exploration, another convulsive seizure occurred and seizures have continued periodically since.

On September 24, 1934, in a subsequent admission hemorrhoidectomy was done because of rectal bleeding. Ether anesthesia was given to the same depth and for the same length of time as at the previous exploration. On completion of the operation, the patient's blood-sugar was 240 milligrams per cent. A few hours later, it dropped to 72 milligrams per cent, and the following morning the patient had another hypoglycemic convulsion.

We have been debating the advisability of re-exploration of the pancreas with the thought in mind that subtotal pancreatectomy be done.

Comment: The two outstanding clinical problems in dealing with cases of chronic hypoglycemia are essentially (1) the identification of instances of hypoglycemia as being due to hyperinsulinism. It is immediately apparent that hypoglycemia and hyperinsulinism are not synonymous, for hypoglycemia may be due also to disturbances of pituitary, adrenal, liver, and other complex functions not understandable in the present state of our knowledge. A means of differentiating the hypoglycemia of hyperinsulinism from that of other causes yet remains to be established. (2) The manner of dealing with instances of chronic hypoglycemia in which a tumor of the pancreas cannot be demonstrated at operation is not a matter of general agreement. In the September issue of *The Southern Surgeon* for 1934 Simon of Birmingham presents two tables, each containing nine cases; in the first, all had tumors in the excised specimen of pancreas and all except the first case, who had a cercinoma, have remained well following operation; in the other nine cases in Table II, no tumor was found but a portion of the pancreas was excised nevertheless. In eight of these only temporary improvement followed; in the ninth, Simon's case, all but the head of the pancreas was excised and at the time of the report, eleven months later, the patient was well. Similarly Graham and Hartmann report ("Surgery, Gynecology, and Obstetrics, September, 1934) the instance of a one-year old infant in which Graham excised 80 to 90 per cent of the pancreas for chronic hypoglycemia in which excised specimen no tumor was found. The patient was well fourteen months later when the report was made. From his own experience, however, Judd (discussion in "Western Surgical Association," 1934) is inclined to believe that one should not be too optimistic over the expected results in instances of chronic hypoglycemia in which no tumor is demonstrated.

In addition to these clinical problems there yet remains to be determined the biologic character of some of these pancreatic tumors. That non-functioning adenomas may exist in the pancreas without causing hypoglycemia has been established; they may also be present in the pancreas in diabetes. Whether some of the tumors, though small, described as carcinomas will exhibit the features of metastases and recurrence common to malignant neoplasms remains to be determined. The unusual clinical behavior of mixed tumors in its sister serous gland, the parotid, in the light of its histological features, which are frequently those of an adenocarcinoma with cartilage, is well known.

Discussion of Dr. Wangensteen's Paper

Dr. Rudolph W. Koucky said that the histology of these tumors of the pancreas is roughly that of the normal islets of Langerhans. There is a specific secretory granule, called the Beta granule by Bensley, which characterizes the islet cell. These granules have been identified in some of the tumors reported in the literature. In our own group of three cases, these granules were demonstrated once. The practical importance of this point is that when such a tumor is removed it should be immediately fixed in a chromate solution in order to preserve these granules. The pathology in the remainder of the body is not very marked. There is a loss of glycogen in the tissues. Some changes have been described in the nerve cells by Terbuggen. These consist of swelling and atrophy. The process apparently is reversible. It is estimated that the normal secretion of the pancreas is about nine times that required by the body. Since many of these tumors have been very small, it is difficult to see how they could produce a hyperinsulinism, in the presence of such a normal excess. It has been suggested that the secretion of the islets is a perverted one. The hypoglycemia found in patients without tumors of the islets is extremely interesting. Such a condition has been reported at least three times with carcinoma of the liver. It has also been reported with tumors of the adrenal, with inflammatory lesions of the adrenals, and conditions in which no pathology was demonstrated. The cause of these cases of hypoglycemia has not been explained.

Respectfully submitted,

F. A. Olson, *Secretary.*

WOMAN'S AUXILIARY

President—Mrs. Martin Nordland, Minneapolis
Editor—Mrs. C. F. Ewing, Wheaton

St. Louis County

Mrs. Harry Klein opened her home for a luncheon of the St. Louis County Medical Society Tuesday, April 2. Mrs. Gage Clement, Mrs. Nathan Braverman, Mrs. Arvid Hedberg and Mrs. R. M. Mayne assisted. Mrs. Arvid Hedberg, vice president, presided at the business meeting which followed the luncheon.

A Valentine Bridge Luncheon was held at the home of Mrs. W. A. Coventry for the February meeting The usual Christmas baskets were packed for the rural communities this year, and cod liver oil was supplied for the rural districts.

A new plan of increasing the fund in the treasury has proved successful. Fifty cents is charged for luncheons as usual, but six members furnish the luncheon and donate the food and the fifty cents goes into the treasury so that in this way about $15.00 is cleared every month.

Mower County

The Women's Auxiliary of the Mower County Medical Society met Monday afternoon, March 25, at St. Olaf Hospital for its annual session, Mrs. G. E. Hertel presiding. There were seven members present. The following officers were elected for the coming year: President, Mrs. Hertel; vice president, Mrs. P. A. Loomen; secretary, Mrs. R. S. Hegge, and treasurer, Mrs. P. A. Robertson. Reports were given by the secretary, treasurer, *Hygeia* and sewing committees. During the year ten layettes were made and given to needy families. The last two meetings have been devoted to making surgical dressings for the hospital. Light refreshments were served by Miss Hattie Rost, the superintendent.

This past year eight meetings have been held, on the fourth Monday in the month. No meetings were held in June, July, August and December.

FORTIFICATION OF FOODS OTHER THAN DIETARY STAPLES WITH VITAMIN D

The Committee on Foods reports that there is no convincing evidence from the standpoint of public health of a need for the fortification of foods with vitamin D other than such staple products as milk, cereals and bread, which form the basis of the customary diet of the public throughout the year. Examples of foods not warranting fortification with vitamin D are sausage and ice cream and such accessories as chewing gum.—*Journal A. M. A.*, February 16, 1935, p. 563.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

BOOKS RECEIVED FOR REVIEW

What You Should Know About Heart Disease. Harold E. B. Pardee, M.D. Asst. Professor of Clinical Medicine, Cornell University Medical School, etc. 127 pages. Illus. Price, cloth, $1.50. Philadelphia: Lea & Febiger, 1935.

Martini's Principles and Practice of Physical Diagnosis. From the authorized translation by George J. Farber, M.D. Edited by Robert F. Loeb, M.D. 213 pages. Illus. Price, cloth, $2.00. Philadelphia: J. B. Lippincott Co., 1935.

The Nervous Patient. Charles Philipps Emerson, M.D., Research Professor of Medicine, Indiana University School of Medicine. 453 pages. Price, cloth, $5.00. Philadelphia: J. B. Lippincott Co., 1935.

Physical Diagnosis. Seventh Edition. Warren P. Elmer, B.S., M.D., Assoc. Professor of Clinical Medicine, Washington University School of Medicine, etc., and W. D. Rose, M.D., Late Associate of Medicine, University of Arkansas. 919 pages. Illus. Price, cloth, $8.00. Saint Louis: C. V. Mosby Co., 1935.

Physiology in Modern Medicine. Seventh Edition. J. J. R. MacLeod, M.B., LL.D., D.Sc., F.R.C.P., Regius Professor of Physiology Univ. of Aberdeen, Scotland, etc. Assisted in Present Edition by Philip Bard, et al. 1154 pages. Illus. Price, cloth, $8.50. St. Louis: C. V. Mosby Co., 1935.

A Textbook of Surgery. Second Edition. W. Wayne Babcock, M.D., F.A.C.B., Professor of Surgery and Clinical Surgery, Temple University, etc. 1312 pages. Illus. Price, $10.00, cloth. Philadelphia: W. B. Saunders Co., 1935.

Methods of Treatment. Fifth Edition. Logan Clendening, M.D., Clinical Professor of Medicine, University of Kansas, etc. 879 pages. Illus. Price, cloth, $10.00. St. Louis: C. V. Mosby Co., 1935.

Diseases of the Skin, Ninth Edition. Richard L. Sutton, M.D., Sc.D., LL.D., F.R.S., Professor of Dermatology, University of Kansas, and Richard L. Sutton, Jr., M.D., A.M., L.R.C.P., Assistant in Dermatology, University of Kansas. 1433 pages. Illus. Price, cloth, $12.50. St. Louis: C. V. Mosby Company, 1935.

PRACTICAL ENDOCRINOLOGY. Max Goldzieher, M.D., Endocrinologist, Gouverneur Hospital, New York City. 326 pages. Illus. Price $5.00. New York: D. Appleton-Century Co., 1935.

Practical Endocrinology by Max Goldzieher is very well and interestingly written. The author starts at the beginning of the book to deal with the function of various endocrine glands, and then takes up definite symptoms and physical defects, and their relation to glandular disturbances.

In the last half of the book a good deal of attention is paid to the treatment of these conditions and the glands that are definitely at fault.

The discussions in the book are short, complete, and very much to the point, so that one can obtain a good deal of knowledge in a very short time.

The illustrations are very well done, and add very much to the effectiveness of the book.

Adam M. Smith, M.D.

MINOR SURGERY IN GENERAL PRACTICE. By W. T. Gibb, M.D., Consulting Surgeon, City Hospital and Neurological Hospitals, New York City. 429 pages. Illus. Price, $5.00. New York, P. B. Hoeber, 1934.

This is the first of a series of monographs for the general practitioner prepared under the editorial supervision of Dr. T. L. Stedman. Books on pediatrics, differential diagnosis and therapeutics by other authors are in preparation. Dr. Gibb is consulting surgeon to the City, Central and Neurological hospitals in New York City. His handbook discusses the management of such cases as are treated by the practitioner with the surgical instruments ordinarily carried in his handbag and the commercially prepared equipment supplied or obtainable by the local druggist. Varicose veins, bandages, anesthesia, accidental injuries or inflammations and the removal of minor growths, are discussed as well as such physical defects including fractures and dislocations as can be cared for by the local physician.

The handbook should be valuable especially to the recent graduate who locates away from a hospital center and who realizes that neglected minor surgery can develop into major and sometimes embarrassing surgery.

Hamlin Mattson, M.D.

BODY MECHANICS IN THE STUDY AND TREATMENT OF DISEASE. Joel E. Goldthwait. M.D., L. T. Brown, L. T. Swain, and J. G. Kuhns. 281 pages. Illus. Price, $4.00. Philadelphia: J. B. Lippincott Co., 1934.

In this little book much of Goldthwait's previous writings on this subject are summarized in readable and handy reference form.

The importance of posture in the treatment and prevention of disease is emphasized. Particularly worthwhile are the sections on backache and arthritis, both of which the authors feel can be aided by correction of faulty body mechanics. Exercises are clearly outlined and simplified for instruction.

A plea is made for the rehabilitation of the chronic invalid who is so often neglected after the acute manifestations of his disease have subsided. The book is a helpful contribution to a much neglected field.

S. W. Shimonek, M.D

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society.

Volume 18 MAY, 1935 Number 5

VALUE OF CHOLECYSTOGRAPHY BY THE ORAL METHOD, WITH AN ANALYSIS OF 189 OPERATED CASES*

EDWARD SCHONS, M.D., F.A.C.P.

Saint Paul

MUCH has been written on the use and value of cholecystography, as practiced both by the intravenous and by the oral method. Many series of cases have been reported in the effort to evaluate the procedures correctly.

The opinion for a long time was that the intravenous method is much more reliable than is the oral. This feeling has changed considerably, the oral method having come to be regarded in many places, as little, if any, inferior to the intravenous. It appears to be a fact that a normal gallbladder will usually show a fairly good shadow when the dye in liquid form is given by mouth, provided there is not a disturbed condition of the stomach sufficient to cause early vomiting of most of the dye, and provided there is no high grade pyloric obstruction.

It seems worthwhile to report the operative and pathological findings in 189 consecutive patients on whom the oral cholecystographic examination was done prior to operation. Several of the well-known liquid preparations on the market were used and a careful technic employed. The method of administration, time of taking the films, etc., have been modified slightly from time to time and the radiographic technic improved, with some improvement in the results.

All of the cases of this series were operated upon at St. Joseph's and Bethesda Hospitals, St. Paul, to the staffs of which I am indebted for the opportunity to present this study. Practically all had cholecystectomies performed. Most of the patients were operated upon soon after the cholecystographic examination, a few up to a year or more following the examination. A few were examined more than once. In these cases the examination nearest the time of operation was used for the purpose of cholecystographic interpretation.

The following classification into which the cases were grouped appeared most serviceable.

1. Those showing a normal response: A clear-cut shadow of moderate size, of fairly good and uniform density, with prompt and marked contraction after food containing egg yolk and fat, without stone shadows or mottling limited to the gallbladder and without deformity. Sixteen cases (8.5 per cent).

2. Those giving a good or poor shadow, with positive or negative stone shadows or suggestive mottling which appeared to be limited to the gallbladder shadow, filling defects of any kind, distortion which was constant in character, poor contraction, or markedly delayed emptying. One hundred nineteen cases (62.9 per cent).

3. Those with no shadow which could be recognized as the gallbladder, with or without dense shadows characteristic of gallstones. Fifty-four cases (28.5 per cent).

Absence of Shadow

I shall consider first the cases which showed no cholecystographic shadow, interpreted as nonfunctioning gallbladders. Of the fifty-four cases in this group, thirty-five (65 per cent) showed stones at operation.* In only six cases of this group (11.1 per cent) were the stones dense and positively identified in the roentgenograms. Ten additional patients, who had definite stones at operation, showed faint or more or less marked mottling in the gallbladder region. The interpretation in these cases varied from somewhat suggestive of stones to probable stones. Only one additional case, considered suggestive of stones in the cholecystograms, failed to show stones at operation. In nineteen cases the stones were completely non-opaque and showed no evidence roentgenographically. Nineteen (35 per cent) of the non-visualized gallbladders showed no stones at operation.

---

*Read at the joint meeting of the Minnesota Radiological Society with the Minnesota State Medical Association, at Duluth, July 16, 1934.

*One of these contained gritty material, without definite stones.

Most of the cases of the non-function group showed at operation or pathological examination also other evidence of gallbladder disease. The pathological changes were most severe in the stone cases, but also occurred in most of the cases without stones. The pathological findings and their frequency of occurrence are shown in Table I.

TABLE I. OPERATIVE FINDINGS IN FIFTY-FOUR NON-VISUALIZED GALLBLADDERS

Findings	*Cases*
Stones	35
Adhesions to duodenum, colon, omentum, etc.	30
Large or distended gallbladder	27
Small, shrunken gallbladder	2
Injected or color changes	14
Wall thickened	18
Nodes along the ducts	3
Small papillomas	2

The more severe pathological conditions among these fifty-four cases were as follows: three cases, acute cholecystitis; one, acute necrotic cholecystitis, with cholecystoduodenal fistula; one, acute, with empyema; one, gangrenous; three, empyema; one, subacute. Stones were present in seven of these ten severely infected cases. Most of the remaining cases had an operative or pathological diagnosis of chronic cholecystitis, based on the presence of definite adhesions or one or more of the other gross findings, with or without microscopic evidence. In a few the changes were rather minimal. Two showed only cholesterosis.

In five cases which showed no cholecystographic shadow, other diseases than that of the gallbladder appeared to be the cause of the symptoms at the time. Table I (a) shows the gallbladder findings in these cases.

Many, but not all, of the gallbladders removed were examined microscopically. Four of those examined showed little or no microscopic evidence of pathology. The findings at operation in these cases were:

1. Injected and distended gallbladder, with adhesion to duodenum and periduodenitis.
2. Gallbladder soft and thin walled, but surrounded by adhesions to duodenum. A gastroenterostomy was undone, no evidence of ulcer being present.
3. Wall thickened, probable cholecystitis Strawberry mucosa on section after removal. Duodenal ulcer.
4. Gallbladder and ducts bound down by adhesions; gallbladder wall thickened.

It is seen from the above that all showed some degree of disease of the gallbladder or ducts, only one (No. 3) showing important extrabiliary pathology which may have been responsible for the symptoms.

Abnormal Character of Shadow

The abnormal shadow group, 119 cases (62.9 per cent) of the 189 operated cases, showed a poor shadow, with or without other cholecystographic evidences of pathology; or a fairly good shadow, but the presence of such other evidences of pathology as: definite stone shadows, mottling limited to the gallbladder, an abnormally large gallbladder shadow, distortion, poor contraction and emptying. Sixty-nine (58 per cent) of the patients in this group had stones at operation. Eleven (9.2 per cent) had stones which were more or less opaque in the roentgenograms; twenty-three (19.3 per cent) had definitely non-opaque stones. These thirty-four all showed stones at operation or after opening of the gallbladder. One additional case, which was reported as showing stone shadows, showed no stones at operation. Reëxamination of the films of this case shows no shadows which would warrant a definite diagnosis of stones, only slightly suggestive mottling being present in one or two films. A total of thirty-four (28.5 per cent) of the cases in this group were thus definitely and correctly diagnosed as stones; eighteen more showed mottling, ranging in interpretation from questionable to probable. In eleven additional cases, mottling suggestive of stones was thought to be present, but no stones were found. Of the total of sixty-nine cases in this group, in which stones were found at the

TABLE I *(a)*. CASES OF NON-VISUALIZATION WHERE DISEASE NOT IN THE BILIARY TRACT WAS THE CAUSE OF SYMPTOMS

Extrabiliary Diseases	*Gallbladder Findings*
Appendicitis and penetrating duodenal ulcer	Adhesions, very thick gallbladder wall. Microscopically, chronic cholecystitis.
Duodenal ulcer	Thick-walled gallbladder, strawberry mucosa. No marked microscopic change.
Low grade appendicitis	No gross changes, but gallbladder removed. Microscopically, low grade chronic cholecystitis.
Low grade appendicitis	Gallbladder distended and does not empty. Microscopically, chronic cholecystitis.
Acute appendicitis*	Gallbladder very large and adherent. Microscopically, chronic cholecystitis.

---

*Autopsy showed carcinoma of cardiac portion of stomach. Stomach had not been examined roentgenologically.

operation or after section of the gallbladder, in fifty-two (75 per cent) a positive or suggestive diagnosis by cholecystography was correct. In nineteen cases (15.9 per cent) of this group in which stones were found at operation, their presence was not surmised from the roentgenograms. Fifty (42 per cent) showed no stones at operation.

Most of the cases showed some type and degree of pathological change. The various pathological changes, as would be expected, were more marked and frequent in this group in the stone cases than in those without stones (as was found in the group of cases showing no cholecystographic shadow), but these changes were also frequent where no stones were present.

Table II shows the more important and frequent changes which were found at operation or upon section of the gallbladder in the poorly functioning group.

TABLE II. OPERATIVE FINDINGS IN ONE HUNDRED NINETEEN POORLY FUNCTIONING OR ABNORMAL SHADOW CASES

Findings	*Cases*
Stones	69
Adhesions to duodenum, colon, omentum, etc.	53
Large or distended gallbladder	23
Small, shrunken gallbladder	2
Injected or color changes	15
Wall thickened	38
Nodes along ducts	8
Papillomata	2

As in the nonfunctioning group, most of these were recorded with an operative or pathologic diagnosis of chronic cholecystitis. Three had a diagnosis of acute cholecystitis; three, subacute cholecystitis; one, empyema with gangrene. In nine there was only a strawberry gallbladder, but two of these contained stones and one a soft, yellow mass, considered the beginning of a stone. Two had carcinoma of the gallbladder; one, carcinoma of the liver; one, hepatitis; one, large, fibrotic right liver lobe.

Important extrabiliary pathological conditions were found in eleven cases. The operative gallbladder findings in these cases are detailed in Table II(a).

The presence of microscopic evidence of cholecystitis does not appear to be an absolute index of the grade of disease present. As in the no-shadow group, but occurring much more frequently, there were cases which showed very little or no microscopic evidence of disease, but marked operative evidence of disease. Some of these cases were:

1. Filled with stones. Very thick gallbladder wall.
2. One stone.
3. Soft stones. Papillomas.
4. Gallbladder twice normal size, buried in adhesions to omentum, duodenum and colon.
5. Large, thick walled gallbladder. Operative diagnosis, chronic cholecystitis.
6. Subacute cholecystitis, dense adhesion.
7. Gallbladder very large, thick walled, subserous deposit of fat.
8. Gallbladder adherent to transverse colon and omentum, somewhat thickened.
9. Thick wall, large glands along ducts, marked subperitoneal deposit of fat.
10. Considerably enlarged, somewhat thick, cannot be emptied.

TABLE II *(a)*. CASES OF ABNORMAL CHOLECYSTOGRAPHIC SHADOWS WHERE IMPORTANT EXTRABILIARY DISEASE WAS PRESENT

Extrabiliary Disease	*Gallbladder Findings*
Acute pancreatitis	Cholecystitis with adhesions
Duodenal ulcer	Gallstones
Duodenal ulcer	Gallbladder adherent to duodenum and transverse colon
Appendicitis	Gallstones
Appendicitis	Soft mass in gallbladder, beginning of stone. Early cholesterosis
Appendicitis	Gallstones
Appendicitis	Gallstones
Appendicitis	Dense adhesions, right upper quadrant, binding down common duct
Appendicitis	Gallstones
Appendicitis	Large gallbladder; did not empty; adherent to stomach
Mucocele of appendix	Gallstones

Normal Shadow

The normally functioning group is a small one, not because a normally functioning gallbladder is infrequently found by cholecystography, but because no cases found normal are operated upon, unless clinical evidence of gallbladder disease sufficient to outweigh the negative cholecystographic findings is present, or unless there is other upper abdominal disease requiring operation, during which the gallbladder region may be explored. Lower abdominal operations do not permit entirely reliable examinations of the gallbladder region, upon which to judge the correctness of the cholecystographic evidence, and I have therefore excluded one case where the gallbladder was examined during a pelvic operation, pronounced negative, and not removed. Opportunities to check up reliably on negative cholecystographic findings are thus seen to be comparatively infrequent. There are no cases in this group where an upper abdominal operation was done without removal of the gallbladder, while there are fifteen cases where the gallbladder was removed in the face of a negative cholecystographic report.

The findings in these cases are shown in Table III.

Of these fifteen cases, seven were recorded with an operative or pathological diagnosis of chronic cholecystitis; in one the diagnosis was cholesterosis. Five showed little or no microscopic changes.

TABLE III. OPERATIVE FINDINGS IN FIFTEEN CASES SHOWING NORMAL CHOLECYSTOGRAPHIC FINDINGS

Findings	*Cases*
Stones	2
Adhesions	8
Large or distended gallbladder	4
Color changes	3
Wall thickened	8
Nodes along ducts	5
Papillomata	1

The high percentage of disease is undoubtedly due to the fact that this group is small and constitutes a much smaller and clinically proportionately worse fraction of the cholecystographically negative cases, than do the operated cases in the other two groups.

Summary and Comment

The conclusions to be drawn from this analysis are clearly that the oral cholecystographic test, if properly applied, may be relied upon to indicate correctly the presence of disease of the biliary system in a high percentage of cases.

The presence of stones, associated with other pathological changes, in such a high percentage of the no shadow and abnormal shadow cases (65 and 58%, respectively), makes it logical to expect that a large additional percentage in each group should have symptom-producing pathological changes without stones. The operative findings recorded and the fact that the surgeon thought them sufficient to warrant removal of the gallbladder, confirm the value of the positive oral test, even if no stones are demonstrated, in indicating the presence of pathology, with or without stones. If the gallbladder does not function, the probability of disease is very high. The probability of stones, visible or invisible, in these cases is high. If the gallbladder function is poor, the probability of gallbladder disease is high, but not as high as in the absence of any shadow. If a shadow is present, about 40 per cent of noncalcified stones, in addition to calcified stones, may be detected with certainty and the presence of stones in a further number may be surmised with some degree of probability.

If, on the other hand, the gallbladder shows a good shadow, the probability of the gallbladder being normal is apparently much more doubtful, in the presence of suggestive upper abdominal symptoms, than is the probability of disease being present in the other groups. The incidence of stones in this group (12.5 per cent) is low compared with the other two groups, but the incidence of adhesions and the other findings is high. All these pathological findings occur sufficiently frequently to indicate that more care should be given in following the response after the fat meal, as stones and other abnormality can be excluded with greater certainty if a markedly contracted shadow, in addition to an otherwise normal shadow, is obtained.

The fact that after the oral administration there were so many cases of a normal shadow in spite of later proven disease would appear to indicate that the greater sensitiveness of the intravenous method is not required.

POSTOPERATIVE PULMONARY COMPLICATIONS AND POSTOPERATIVE USE OF THE TRENDELENBURG POSITION*

HOWARD K. GRAY, M.D.

Rochester, Minnesota

THE fact that of patients who have pulmonary complications subsequent to operations within the abdomen, approximately one-half die, is impressive. Agents other than pulmonary complications which impose risk of prolonged convalescence or of death have been reduced nearly to a minimum through clinical investigation and research. The reality must be faced that pulmonary complications continue to constitute the greatest single hazard in abdominal surgery, and if death cannot be ascribed directly to them, not infrequently they so reduce the actual defensive forces that a fatal outcome ensues when recovery otherwise might have followed. The present low mortality rate in abdominal surgery is a tribute to the surgeons who have devoted their attention to this field, but if still further reduction in this mortality rate is to be achieved, every effort should be made to prevent the occurrence of pulmonary complications by meticulous attention to detail before, during, and after the operation.

Etiology

The most widely accepted theory relative to the production of postoperative pulmonary complications is that which attributes the condition to aspiration of infected material. The use of general inhalation anesthesia undoubtedly predisposes to infectious intrapulmonary processes through the irritating effect on air passages. Thus, a medium is created in which this process may thrive. The fact that the incidence of pulmonary complications following the use of spinal anesthesia has been found to be nearly as great as that which follows inhalation anesthesia is difficult to explain. Not infrequently extreme nausea and vomiting are experienced by patients who have undergone spinal anesthesia and, with the increasing tendency toward combining this type of anesthesia with large doses of sedatives, the likelihood of aspirating infected material is increased. In general, inhalation anesthesia would seem to be best suited for surgical procedures in the upper portion of the abdomen and spinal anesthesia for those lesions situated below the level of the umbilicus. In the hands of an expert spinal anesthetist, operations may be satisfactorily performed on the stomach and duodenum or on the biliary tract, with the patient under spinal anesthesia, without unwarranted risk. Intratracheal anesthesia likewise has been found to be suitable for surgery of the stomach and duodenum if the services of one who is skilled in the use of the intratracheal tube are available. The tube is chosen to fit the trachea snugly and rarely is material aspirated, and a clear airway is assured at all times.

---

*From the Division of Surgery, The Mayo Clinic, Rochester, Minnesota. Read before the Minnesota State Medical Association, Duluth, Minnesota, July 16, 1934.

Pulmonary complications infrequently are due to the production of infarcts in the substance of the lung by the lodging of emboli. The source of the embolus usually is in the field of operation, or in one of the veins of the pelvis or of the lower extremities. Emboli may vary in size from one scarcely large enough to cause symptoms to one of enormous size which may completely occlude the pulmonary artery and cause sudden death. Such a tragedy may occur with occlusion of one branch of the pulmonary artery, although both branches ordinarily are occluded.

In addition to the aspiration of infected material and to the lodging of emboli in the substance of the lung, infection may be carried through lymphatic channels. Higgins and Graham, and Lemon and Higgins have shown that particulate graphite, when injected directly into the peritoneal cavity of the dog, was readily visible in diaphragmatic lymphatic structures and in the sternal trunk within from ten to twelve minutes. The main collecting trunks of the diaphragm lie below the pleura on the muscle bundles, and it was noted that normal muscular contraction of the diaphragm contributed largely to the passage of the particulate matter. Operations, particularly in the upper part of the abdomen, are attended by a decrease in the activity of the diaphragm. Complete aeration of the lung is thereby inhibited, and a sluggish flow in the diaphragmatic lymphatic system is produced. both of which factors may predispose to pulmonary complications.

Partial or complete atelectasis may or may not be infectious in origin. The most widely accepted theory is that which attributes the condition to blockage of one of the main bronchi by a plug of mucus with subsequent absorption of gases from the distal air passages. Recent experimental work tends to indicate that partial atelectasis of one lobe never occurs. If one of the smaller bronchi becomes occluded, there seems to be sufficient collateral aeration to prevent atelectasis.

Prophylaxis

It is not the purpose of this paper to review the many measures that have been suggested to decrease the incidence of postoperative pulmonary complications. Most of these measures have been adapted with modifications to meet individual requirements. Not infrequently, however, perfectly obvious suggestions are disregarded. Too great emphasis cannot be laid on the need for adherence to detail, for any one of many factors may be responsible for the development of pulmonary complications.

The use of the Trendelenburg position following operation has been suggested, in order that there may be less likelihood of aspirating any material that is vomited or of aspirating the normal secretions of the oral cavity that accumulate in the posterior portion of the pharynx. This is particularly important during the first twenty-four hours after operation, when the patient remains abnormally quiet, owing to the effects of narcotics, and when the cough reflex has not become fully reëstablished.

The development of certain pulmonary lesions and of thrombophlebitis in the lower extremities are closely related. Undoubtedly retardation in the rate of blood flow in the extremity is an important etiologic factor in formation of thrombi. The accepted treatment has been elevation of the extremity and application of external heat. It did not seem unreasonable, therefore, to elevate the extremities as a prophylactic measure in order that the return venous flow might be encouraged during the twenty-four hours immediately after the operation, when activity is at a minimum.

For these two reasons, and because lowering of the head is often indicated following serious abdominal operations, in order to increase the circulation to the higher centers, a series of 276 patients were consecutively placed in the Trendelenburg position for the first twenty-four hours after abdominal operations. In many instances, multiple operations were performed, but only the chief lesion for which surgery was indicated has been included. The position was obtained by raising the foot of the bed approxi-

COMPARISON OF INCIDENCE OF PULMONARY COMPLICATIONS IN RELATION TO WHETHER OR NOT PATIENT WAS PLACED IN TRENDELENBURG POSITION AFTER OPERATION ON VARIOUS STRUCTURES OR FOR VARIOUS CONDITIONS

Structure or condition	Patients not placed in Trendelenburg position			Patients placed in Trendelenburg position		
		Pulmonary complications			Pulmonary complications	
	Patients	Cases	Per cent	Patients	Cases	Per cent
Biliary tract	737	54	7.3	57	1	1.7
Stomach and duodenum	451	44	9.8	65	5	7.6
Uterus, tubes, ovaries	674	20	2.9	37	2	5.4
Hernia	256	14	5.4	29	1	3.4
Large bowel	485	38	7.8	5	0	.0
Small bowel	59	8	13.5	2	0	.0
Appendix	491	20	4.0	61	3	4.9
Miscellaneous				20	0	.0
Totals	3153	198	6.2	276	12	4.3

mately 10 inches (25 cm.). It is obvious that there are certain instances in which the position definitely would be contraindicated, such as in the drainage of any intra-abdominal, suppurating process or when the position produced respiratory embarrassment. The first twenty-four hours after operation was chosen as an arbitrary time limit, chiefly because patients are inactive during this period, and the cough reflex rarely becomes entirely reëstablished sooner. The incidence of postoperative pulmonary complications in the group in which the Trendelenburg position was employed was compared with the incidence of such complications in a much larger group (3153 patients), in which the Trendelenburg position was not employed. The two groups were as nearly alike as possible relative to the type of operation, seriousness of the lesion, age of the patients, type of anesthesia, time of year, and other factors that might influence results.

No attempt was made to subdivide surgical procedures in certain regions into innumerable types of operation, nor was an effort made to correlate the type of pulmonary complications with regions or with operations. It was felt that an attempt to tabulate these data would serve only to confuse the issue. The various pulmonary complications, which were of such severity as to prolong the patient's convalescence beyond the normal limit, were grouped together in order that the investigation might be simplified. The most common pulmonary complications were bronchitis, bronchopneumonia, partial or total atelectasis, infarct, and pleurisy with or without effusion. Occasionally, lobar pneumonia was observed and, rarely, suppuration in the pleural space. Aggravation of previous pulmonary lesions by conditions such as bronchitis and bronchiectasis, has been noted and these cases have been included in the present study. In table 1 may be seen the comparative results.

Comment

The apparent reduction in the morbidity rate of pulmonary complications by the postoperative use of the Trendelenburg position may be due to the fact that a relatively small group of patients has been studied. However, a reduction of 30 per cent in the incidence of postoperative pulmonary complications is sufficiently large to warrant thorough trial. There is no discomfort in the position if elevation of the foot of the bed is moderate and, with rare exceptions, there are no contraindications. Of the thirteen patients who suffered from pulmonary complications, in spite of having been placed in the Trendelenburg position, six died (46.1 per cent). Possibly then, the incidence of postoperative pulmonary complications can be reduced by 30 per cent through the simple expedient of the use of the Trendelenburg position, and if so, possibly an appreciable reduction in the general operative mortality rate in abdominal cases will be achieved.

Summary

A brief résumé of the most important etiologic factors in the production of postoperative pulmonary complications has been given. A series of 276 patients who had undergone abdominal operations and were consecutively placed in the Trendelenburg position for the first twenty-four hours after the operation were compared with a similar but larger group of 3,153 patients not

so treated; the incidence of postoperative pulmonary complications was 30 per cent less in the group in which the Trendelenburg position was employed.

A plea is made for meticulous attention to detail in the preoperative, operative, and postoperative period, in order that the incidence of postoperative pulmonary complications may be reduced.

Bibliography

1. Higgins, G. M., and Graham, A. S.: Lymphatic drainage from the peritoneal cavity of the dog. Arch. Surg., 19:453-465, (September) 1929.
2. Lemon, W. S., and Higgins, G. M.: Lymphatic absorption of particulate matter through the normal and the paralyzed diaphragm: an experimental study. Am. Jour. Med. Sc., 178:536-547, (October) 1929.

A STUDY OF TUBERCULOSIS IN FAMILIES*

G. A. HEDBERG, M.D.

Nopeming, Minnesota

NOPEMING Sanatorium has conducted outpatient work since its inception in 1912. Since 1918 tuberculosis clinics have been conducted at strategic points throughout the county. These clinics have provided contact with suspected cases of tuberculosis as well as follow-up of ex-sanatorium patients and members of their families. Since the popular use of x-rays in tuberculosis work, films have been taken at Nopeming and Duluth Hospitals of suspected cases of tuberculosis and of contacts. This year arrangements have been made to take x-rays at the various hospitals on the Range. Nopeming Sanatorium maintains a central registry of the x-ray readings, clinical records, et cetera, of all of this work. In addition to this work attempt is made to check all family members and close contacts visiting patients at Nopeming with Mantoux tests and x-ray films.

In our current files of contact follow-up records of patients now in the sanatorium and of recently found positive sputum cases we have ninety-four families with more than one member having demonstrable tuberculosis of the adult type. Of this number sixty-eight have two cases, twenty-one have three cases, and five have more than three cases in the family. It is significant that in this group the presence of positive sputum cases over a long period of time is much more frequent in families with three cases than in those with two. In the five families having more than three cases of tuberculosis, three have had a member die in the home of this disease after prolonged illness under care of members of the family. The fourth family had a father with chronic non-disabling tuberculosis which was found after one son had been admitted to the sanatorium with far advanced tuberculosis. Positive sputum could not be demonstrated but the history revealed a chronic cough and expectoration of long standing several years previous. It is reasonable to presume that positive sputum was present at that time. In the fifth family a similar condition existed. The father refused examination of any sort but has had a chronic productive cough as long as members of the family can remember.

Investigation of the economic and social conditions of the families are too incomplete to warrant conclusions. From the meagre information available and from the reports of the patients themselves, one gains the impression that the average conditions at home were below the normal level in the families having more than one case of tuberculosis, but that there was no significant difference in the status of the families having two, three, or more cases, except as a result of the decreased earning power as the additional cases developed. Overcrowding in the home and improper hygiene was quite common in this series but this is not unusual in a great many of the rural communities in the county.

The factors of individual and racial resistance to tuberculosis must be considered. Of course one would assume that inherent resistance of the individuals in each family would likely be similar to some extent. In many of the families one is struck by the similarity of types of lesions in members of the same family. A large number of nationalities are represented by those who have immigrated to St. Louis county in the last generation to work in the woods, the mines, and at farming. In the group of families studied there is no marked preponderance of any nationality out of proportion to its number in the county population.

---

*Read before the Trudeau Society at the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

It would seem that the most important and significant factor in the occurrence of tuberculosis in several members of a family is the presence over a prolonged period of an "open" case. The dosage of tubercle bacilli seems to overshadow other factors in producing active disease after one has developed the primary infection. The interval between the added infection and the production of active disease may be several years.

Of the members of families of patients with positive sputum who have been tuberculin tested, over 80 per cent react positively when 1/10 milligram of old tuberculin has been injected intradermally. It is significant that the negative reactors are usually older children in the family who probably have had less contact with the patient. With one exception in this group, x-rays taken of negative reactors in contact families showed no evidence of tuberculosis. In the positive reactors examined by x-ray, parenchymal lesions of the primary type were most often found in the children, and, indeed, the younger the child in the family the more marked the involvement. When these lesions have been demonstrated the child has either been observed at the sanatorium or has been allowed to remain at home and checked by frequent Roentgenograms until the lesion has markedly resolved or calcified. When home conditions are good and the source of infection has been eliminated home observation is now being used at Nopeming unless the child is obviously ill. In the asymptomatic child with a parenchymal lesion, hospitalization is advised only when the primary lesion shows evidence of progression.

It is our feeling at Nopeming that the responsibility for the supervision of contact follow-up rests with the sanatorium. When possible it is most ideal to have this work done by the family physician. We find, however, that the majority of contact families in St. Louis county are unable to finance the complete examination without some financial aid. The majority of the x-ray work, therefore, is done at the sanatorium or at the nearest x-ray laboratory able to do satisfactory work. An attempt is made to collect all or part of the fee charged for the x-ray by the laboratories and the sanatorium pays for the remainder. Experience has proven that this type of work, considered from the financial aspect alone, pays. Through this work numerous cases of minimal tuberculosis have been discovered in time to secure arrest at home without the necessity of sanatorium residence. A survey of Nopeming patients made last year showed that the average stay of patients admitted through the out-patient clinics and contact investigation was 70 per cent that of those patients admitted by their family physicians.

In conclusion, short histories of seven family groups are presented:

Family No. 1.—Alfred S. (key case), hospital orderly since 1929, in April, 1933, developed a cough and began losing weight. On July 20, 1933, he consulted a physician who found positive sputum present. X-ray showed far advanced tuberculosis. Illness ran a very active course and patient developed meningitis and died at Nopeming, December 14, 1933. He had been living at his sister's home for one year previous to his admission to Nopeming.

Henning W., brother-in-law, is in good health. He was checked as contact: Mantoux positive; x-ray negative.

Jenny W., sister, is in good health. Checked as contact: Mantoux positive; x-ray negative.

Marvin W., nephew, became ill in August, 1933, and died of tuberculous meningitis October 7, 1933.

Gordon W., nephew, has been under out-patient observation since August, 1933. X-ray showed a tuberculous lesion in right lung which was considered primary. In April, 1934, there was an extension of the disease and it was felt best to hospitalize him. Now at Nopeming.

Family No. 2.—Samuel J. is not ill. His first two wives died, cause unknown. The third wife died of tuberculosis. X-ray negative. Mantoux positive.

Turna J., daughter (key case), died at home of tuberculosis in January, 1925. She was cared for by her mother, Mrs. Mary E. J.

Mrs. Mary E. J., wife, was admitted to Nopeming, February, 1925, as a suspect. Negative sputum. X-ray showed a Ghon tubercle, but no evidence of active tuberculosis. Discharged in March, 1925. Readmitted in August, 1925, following premature delivery of twins. Discharged again in September. Readmitted August 31, 1928, with a diagnosis of miliary tuberculosis. Sputum positive. Died eleven days later.

Hilda J., daughter, was admitted to Nopeming, February, 1925, for observation as a suspect. Positive Von Pirquet reaction. No definite tuberculosis in x-ray. Discharged in March, 1925. Well until April, 1928. Readmitted to Nopeming August, 1928, as MAA. Sputum positive. Still a patient. Poor prognosis.

John E. J., son, was admitted to Nopeming, July, 1925, FAB. Positive sputum. Never did well. Remained until June, 1928, when he developed tuberculous meningitis and died.

Mrs. John M., step-daughter, was admitted to Nopeming, August, 1932, FAA. Positive sputum. Developed tuberculous meningitis and died September 20, 1932.

(A) Matt M., husband. Positive Mantoux. Negative chest.

(B) Donald M., son. Positive Mantoux. Calcified Ghon tubercle. No evidence of activity.

William J., son, was admitted to Nopeming in July, 1928. Positive Mantoux. MAA. He has required continuous sanatorium care to date. X-ray shows fibrosis (MAA). Guinea pig (sputum) positive.

Edwin J., son, was admitted to Nopeming, July, 1928. Positive Mantoux. X-ray showed childhood tuberculosis. Discharged for home care, June, 1932.

Ruth J., daughter, was admitted to Nopeming, September, 1928. Positive Mantoux. X-ray showed childhood tuberculosis. Has done only fairly well. Discharged April, 1934.

Wilma J., daughter, was admitted to Nopeming September, 1928. Positive Mantoux. X-ray showed childhood tuberculosis. Did well. Discharged August, 1929.

Siami J., daughter, is not ill. Positive Mantoux. Negative x-ray.

Jenny J., daughter, is at home. Her health is fair. There is no record of a check-up.

Family No. 3.—Mrs. Johanna Z. (key case), died of tuberculosis in January, 1929. Repeated positive sputum reports. Remained at home through illness.

Anton Z., husband, is not ill. X-ray showed pneumoconiosis with calcified Ghon tubercle.

Jennie Z., daughter, became ill in July, 1931. Positive sputum, September, 1931. She remained home until November, 1931 and is still a patient with positive sputum. She is doing poorly and has phrenic, with pneumo on contralateral side.

Mrs. Barbara J., neighbor, took water supply from Z's in winter time. She became ill in July, 1931. Positive sputum in September, 1931. Remained home until September, 1932. Pneumothorax case. Prognosis fair. Has two children:

(A) Betty, aged six. Negative chest. Positive Mantoux. Not yet x-rayed.

(B) Donald, aged four. Negative chest. Positive Mantoux. Not yet x-rayed.

(C) Husband not yet checked. Health reported good.

Tony Z., son, is not ill. Negative chest repeatedly. Positive Mantoux. Has not been x-rayed.

Ann Z., daughter, is not ill. Negative chest. Positive Mantoux. X-ray shows Ghon tubercle not completely calcified. At home.

Angela Z., daughter, is not ill. Occasional physical findings. Positive Mantoux. X-ray shows childhood tuberculosis with Ghon tubercle. Under observation at home.

Mary Z., daughter, is at Nopeming. MAA with negative sputum. Positive Mantoux. Good prognosis.

Joseph Z., son, was at Nopeming for observation from February 27, 1933, to September 10, 1933. Negative chest. Positive Mantoux. X-ray shows childhood tuberculosis. Prognosis good.

Frank Z., son, was at Nopeming for observation from February to September, 1933. Negative chest. Positive Mantoux. X-ray shows childhood tuberculosis. Prognosis good.

Margaret Z., daughter, was at Nopeming for observation from February to September, 1933. Negative chest. Positive Mantoux. X-ray shows childhood tuberculosis.

Family No. 4.—Mrs. Mary M. (key case), was diagnosed as having pulmonary tuberculosis in October, 1929. There was positive sputum at this time and consistently thereafter. She was admitted to the hospital in October, 1929, and left three weeks later, refusing to return or go to a sanatorium. She lived at home with her family until death in September, 1931.

Mike M., husband. Positive Mantoux. X-ray negative.

Nick M., son, aged nineteen years. Positive Mantoux. Negative chest examination and x-ray.

Peter M., son, aged eighteen years. Positive Mantoux. Negative chest examination and x-ray.

Mildred M., daughter, aged fifteen years. Positive Mantoux. Negative chest examination and x-ray in 1931. X-ray, February, 1934, showed FAA. Admitted to Nopeming, April, 1934. Pneumothorax.

Mollie M., daughter, aged fourteen years. Positive Mantoux. Negative chest. X-ray showed calcified glands in left hilus. She was observed at Nopeming from October, 1931, to June, 1932, and is now under home observation.

Dorothy M., daughter, aged twelve years. Positive Mantoux. Negative chest. X-ray showed calcified glands and Ghon tubercle. She was observed at Nopeming from September, 1931, to December, 1931 and is now under home observation.

Helen M., daughter, aged ten years. Positive Mantoux. Negative chest examination. X-ray showed enlarged hilus glands and infiltration into left upper lobe. She was observed at Nopeming from October, 1931, to December, 1931.

Annie M., daughter, aged eight years. Positive Mantoux. Negative chest examination. X-ray shows enlarged hilus glands and infiltration into left upper lobe. She was observed at Nopeming from October, 1931, to June, 1932, and is now at home.

Bessie M., daughter, aged seven years. Positive Mantoux. Negative chest examination. X-ray shows recent childhood tuberculosis, right lung. She was admitted to Nopeming, October, 1931, and is still a patient.

Steve M., son, aged four years. Positive Mantoux. Negative chest examination. X-ray showed childhood tuberculosis of left lung. He developed tuberculosis of elbow and spine. Draining pus from sinuses. Positive for tuberculosis.

Family No. 5.—Mrs. Anna S. (key case) was first admitted to Nopeming June 25, 1924. Positive tuberculin. Negative sputum. Minimal A (non-clinical). No expectoration. She was discharged as an inactive case August 15, 1924. She occasionally attended clinics and did well. She has a fourth child.

In May, 1932, she began to cough and lose weight. Sputum at that time was negative. First positive sputum report was in July, 1932. She was admitted to Nopeming August 23, 1932. MAB in August, 1933.

Matt S., husband. Positive Mantoux. X-ray negative.

Edward S., son, went to live on a farm in June, 1932, for the summer. Examination in September, 1932, showed negative chest and negative Mantoux. Mantoux negative again in January, 1933. X-ray repeatedly negative and Mantoux with 1. mg tuberculin negative July, 1933.

Ruby S., daughter, lived with mother until her admission to Nopeming. Examined at clinic in July, 1932. Mantoux positive. X-ray July 30, 1932, showed a childhood lesion. Admitted to Nopeming August, 1932, for observation. Discharged December, 1932. Doing well.

Ardell S., daughter, had contact with mother through breakdown. Examination September, 1932. Mantoux positive. X-ray showed childhood tuberculosis. Observed at home.

Robert S., son, had contact with mother through breakdown. Examined in September, 1932. Mantoux positive. X-ray showed extensive primary lesion. Admitted to Nopeming September 25, 1932. Developed adenitis in spring of 1933, which regressed under ultraviolet ray. Discharged in June, 1934.

Family No. 6.—Anton B., father, is in good health. He has been an underground miner for seventeen years. X-ray shows evidence of pneumoconiosis but no tuberculosis.

Angela B., mother, is in good health. X-ray shows a normal chest.

Angeline B. (key case), worked in same room with a positive sputum patient and became ill Christmas, 1931. Tuberculosis diagnosed February, 1932. Pneumothorax was started by her physician in February, 1932, and patient returned home March, 1932. Sputum reported positive twice in October, 1932. Admitted to Nopeming in June, 1933, as FAB bilateral, with positive sputum. Still a patient.

Julia B., sister, was examined February, 1932. Mantoux and x-ray negative. Mantoux again negative, July, 1932. Mantoux positive, March, 1933. X-rays repeatedly negative to date.

Rose B., sister, was examined as contact in February, 1932. Mantoux and x-ray negative. Mantoux again negative July, 1932. Re-examined in March, 1933. Mantoux positive. X-ray showed a minimal parenchymal lesion in left lung. This lesion has been closely checked by x-ray and is resolving.

Family No. 7.—Florence E. (key case), developed a cough in spring of 1929. She was admitted to Nopeming as FAC in September, 1929. Sputum positive. Phrenic in September, 1930, with marked improvement and negative sputum. Left against advice in April, 1932, and "took the cure" at home. One positive sputum report in January, 1933. In January, 1934, she was readmitted following an abortion. FAC with positive sputum. She now has bilateral cavitation and is a terminal case.

Fritz E., husband, was first examined as contact in January, 1930. X-ray at that time was negative. In July, 1930, he complained of dyspnea and loss of weight of one month's duration. X-ray showed a pleural effusion on right side. He recovered from complaints and continued to work; gained 12 pounds. Mantoux in 1930 was negative. He did not report for re-examination until after wife's re-admission. On February 7, 1934, he was re-examined and at that time stated that he had felt fine and worked every day as a shipping clerk until December, 1933, when he noticed slight fatigue which he attributed to the added burden of his wife's illness. In January, 1934, he developed a "cold" with slight cough and expectoration; no weight loss. X-ray showed a moderately advanced bilateral lesion of an exudative type. He refused hospitalization. Mantoux was negative. X-ray March 1, 1934, showed a marked advance. Sputum was positive March 1, 1934. He was admitted to Nopeming March 11, 1934. Under strict bed rest lesion is beginning to show regression and last two sputum tests were negative. Mantoux is still negative.

Doris E., daughter, was examined as contact. Mantoux positive and x-ray shows calcified hilus glands.

Marion E., daughter. Mantoux positive and x-ray shows calcified hilus glands and Ghon tubercle.

Robert E., son. Mantoux positive and x-ray shows calcified hilus glands.

FACTORS CONTRIBUTING TO THE FURTHER REDUCTION OF TUBERCULOUS INFECTION*

FRANK L. JENNINGS, M.D., F.A.C.P.
Oak Terrace, Minnesota

THAT tuberculosis is a transmissible disease was first definitely proven in 1865 by Villemin. But nearly one hundred years before, laws based on the assumption that the disease was infectious were enacted in the Kingdom of Naples,[2] and those laws were largely instrumental in the 80 per cent reduction of mortality from tuberculosis which took place there up to 1887 and which left that section with a death rate of 195 per 100,000.

Since that time, gradually evolved protective measures and the widespread dissemination of educational information concerning the disease have contributed toward the steadily declining death rate throughout the world. With this decrease in mortality has come a decrease in the infection of individuals with the tubercle bacillus, and we are led to believe from the work done among University students by Myers[7] at Minnesota, who finds 33 per cent of freshmen tuberculin positive, and Soper and Wilson[8] at Yale, who find 59 per cent, that the infection among adults in this country is no longer as high as was formerly thought.

The question which now presents itself is: Can we further reduce the infection of tuberculosis or have we reached the irreducible minimum? With the mortality curve still going down, it is not too much to expect that infection itself can be made to follow.

This paper deals with the advice that should be given tuberculous patients and those who care for them. It discusses those hygienic rules that are not generally in force and refinements of some of the well established rules. It does not touch upon those measures less frequently overlooked which provide for the sterilization of bed linen, dishes, towels, and the like.

In pulmonary tuberculosis, which is the most prevalent form of tuberculosis in this country, it is the sputum which contains the greatest number of bacilli. It is therefore imperative that expectoration be disposed of so effectively that there will be no gross contamination. Since Baldwin[1] brought out the fact in 1898 that patients' hands were more likely to be contaminated if they used handkerchiefs for expectoration than if they used cuspidors, it has been the practice in most institutions to use waterproof paper cups for that purpose. In some institutions, however, patients are still allowed to expectorate into paper napkins.

Tests† have shown that expectoration, the consistency of saliva, will penetrate one thickness of paper napkins in one second or less, two thicknesses in two seconds, and three thicknesses in four seconds.

The rapid transmission of moisture through paper napkins permits the more rapid transmission of tubercle bacilli and other organisms, which makes this method of sputum disposal obviously unsatisfactory. This is true not only for the bed patient but for the ambulant patient and I cannot agree with those who advise the use of rubber lined pockets in which ambulant patients may place soiled paper napkins.

The paraffin coated cardboard pocket sputum cup for ambulant patients and the square covered paraffin coated boxes for bed patients appear then as the best means for sputum disposal.

Another factor that contributes much to the exposure of the healthy person is the expelling of tubercle bacilli during the act of coughing. Although this, too, is a controllable factor, physicians have permitted the patient to handle it in haphazard fashion. Not infrequently one sees the patient hold his napkin at an angle that prevents complete covering of the mouth and nose. Another attempt noticed particularly among women is to cough into a crumpled napkin, which allows the fingers to become contaminated. Then again, the napkin may be held in such a manner that the thumb is interposed between the napkin and the lips.

---

*From the Glen Lake Sanatorium, Oak Terrace, and the Department of Medicine, University of Minnesota. Read before the Trudeau Society at the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

†May be demonstrated either by: (1) one napkin treated with 5 per cent alcoholic sodium hydroxide; another treated with 1 per cent phenolphthalein; (2) one napkin treated with 5 per cent alcoholic ferric chloride and later dusted with potassium ferricyanide.

In my opinion, the most satisfactory method is to hold the napkins so that the fingers will not be contaminated either during the act of coughing or when the napkin is being disposed of (Figure 1). If the napkin is held in this manner, the droplets ejected with the cough are for the most part absorbed and the air from the cough escapes around the edges of the napkin. This requires a napkin of satisfactory weight and at least 6x6 inches in size.

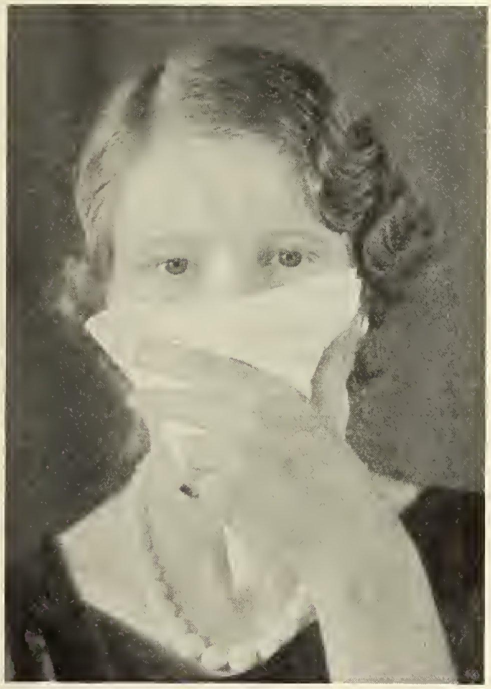


Fig. 1. Correct way to hold napkin.

Gauze napkins were formerly used in most sanatoria, and a patient was given one folded piece of gauze in the morning which he was to use throughout the next twenty-four hours. This, of course, soon became contaminated and everything with which it came in contact became contaminated in addition to the pockets and hands. Of late, gauze has been largely replaced by plain or crepe paper napkins. While this has been a step forward, the napkins available at present leave much to be desired.

I have shown[5] that one thickness of the average crepe paper napkin allows the transmission of organisms rather freely, that two thicknesses reduce this transmission by 85 to 90 per cent, and that three thicknesses practically stop the passage of organisms. In comparing gauze with paper napkins, I have found that one thickness of paper napkin was almost as effective in filtering out organisms as ten thicknesses of gauze of 12x20 mesh (Fig. 2).

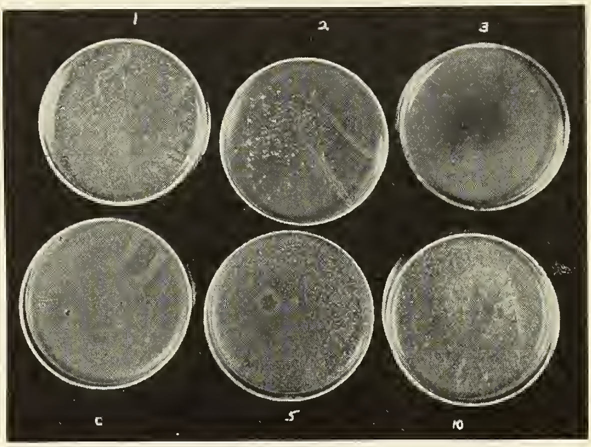


Fig. 2. One, two and three thicknesses of paper napkins compared with five and ten thicknesses of gauze. C—control.

Advising patients to prevent contamination of their hands by using their napkins correctly is of no avail if they are not taught that wetting their fingers before reaching for the napkin will likewise contaminate them. There has recently been placed upon the market a napkin dispenser which permits the patient to procure a napkin with great ease and it is hoped that this will eliminate the wetting of fingers. It is also hoped that medical opinion will force the manufacturers to provide these dispensers with napkins of a texture so firm that one napkin will give as much protection as three do now in checking the transmission of organisms.

To insist that patients hold paper sputum napkins over their mouths and noses while coughing and sneezing is important, but its practical value is nullified if the patient is allowed to lay the used napkin, face down, on his clothing or bed covers. As this is a common practice, I think that its correction should be stressed. Disposal of paper napkins is provided for in the sanatorium by hanging paper bags on the side of the patient's bed, but no provision is made for the disposition of napkins while patients are on their walks. As patients are, for the most part, not ingenious enough to devise means of their own, they should each be provided with manilla envelope or bag for use away from the bedside.

As we have no proof that smoking in moderation is detrimental to the patient with pulmonary tuberculosis, I think we must accept the fact that many individuals who enjoyed smoking before they contracted the disease will continue to smoke during their illness. It is also true that a greater number of people are smoking now than ever before. The possibilities of cigar and cigarette stubs becoming contaminated by tubercle bacilli are great and patients should be taught that the stubs should not be thrown upon the floor nor upon the ground, but should be disposed of in such a manner that they will not be a source of contamination. Pipe stems are as readily contaminated and should be as carefully handled as any other contaminated article.

Artificial teeth and tooth brushes afford other means of transmitting tubercle bacilli. Washings taken from the artificial teeth of eight patients who had positive sputum were injected into guinea pigs and six pigs developed tuberculosis. Likewise, washings were taken from the tooth brushes of another group of eight patients who had positive sputum and were injected into guinea pigs. Three pigs of this group were found to be tuberculous.

It was a revelation to see how and where artificial teeth and tooth brushes were kept by patients with tuberculosis. Teeth in some instances were found on top of the bedside table or loose in the table drawer. One man encountered had difficulty in untangling his watch chain from the wire attachment on his artificial teeth which were thrown carelessly into his drawer. Tooth brushes were found in cardboard containers in which they were originally bought, in cigar boxes with shaving articles, and even rolled into wash cloths, but for the most part they were kept in celluloid boxes. It can be seen that some sort of sanitary provision should be made for the care of tooth brushes for every tuberculous patient and this should not be left to the ingenuity of the individual patient. Special instructions as to the handling of artificial teeth should be given to guard against contaminating the fingers.

Most individuals unthinkingly put various objects in their mouths. Many are in the habit of wetting their fingers before turning the leaves of a book. Others take gum out of their mouths with their fingers. Since these little unconscious acts are numberless, it is not surprising to find such habits firmly set in the individual who develops tuberculosis. For this reason, emphasis should be laid on the correction of these habits to further reduce tuberculous infection. Needless to say, these habits can be corrected by repeatedly calling the patient's attention to them but will never be corrected if they are ignored by those aware of their potential danger.

Perhaps there are those who argue that if too much attention is drawn to the dangers lurking in these simple habits, patients and relatives alike will become too apprehensive and will develop a phthisiophobia. This thought was advanced when Geer[3] introduced his aseptic technic. His experience, however, after a two year trial, has been that relatives, patients, and employes alike welcome the precautions taken.

Library books and paper money offer other vehicles for tubercle bacilli. Mitulesen,[6] in studying the problem of books, cut up thirty-seven books that had been used in the Berlin Public Library for from three to six years and injected the washings made of these clippings into guinea pigs. Twenty-six per cent of the pigs developed tuberculosis and a similar percentage died of septicemia. If it is possible to infect guinea pigs with tubercle bacilli in this manner from books that have been used in a public library, it should be equally possible from books in a sanatorium library. The manner of transmission of infection by fomites such as books has been a problem discussed by public health officials and heads of hospitals for years. Formerly, the danger from this source was considered great. Later experience has proven that it is slight. It has not been shown that library workers are more susceptible to clinical tuberculosis and similar infections than the general population. If the possibilities of infection from books are explained to patients and workers so that they may take the precaution to wash their hands after reading, the likelihood of infection from this source is nil.

Conclusions

The suggestions made here, while designed primarily for the tuberculous patient and the tuberculosis sanatorium, are also applicable to the general hospital as it has been shown by Hill[4] that from 34 to 40 per cent of the cases admitted to general hospitals may be considered infectious in one way or another.

Few patients admitted to sanatoria have any practical knowledge of aseptic procedures. It is therefore necessary that they be given more explicit instructions for the prevention of infection than is at present generally given in sanatoria. I believe that by so doing a further reduction of tuberculous infection can be brought about.

Bibliography

1. Baldwin, E. R.: Infection from the hands in phthisis. Trans. Amer. Clinatological Association, 1898, p. 202.
2. Flick, L. F.: A century's experience in Italy under the influence of the preventive laws of the Kingdom of Naples. Reports Papers of the American Public Health Assn., Vol. XVI, 1890.
3. Geer, E. K.: Primary tuberculosis among nurses. Amer. Rev. Tuberc., 29:88, 1934.
4. Hill, H. W.: One patient in three is infectious so be prepared for him. Hosp. Management, 23:31, 1927.
5. Jennings, F. L.: Permeability of paper (sputum) napkins. To be published.
6. Mitulesen, J.: Contributions on the etiology of tuberculosis. Ztschr. für Hygiene, 44:397, 1903.
7. Myers, J. A., and Wulff, M.: Eleven years' observation on tuberculosis among university students. Amer. Rev. Tub., 26:530, 1932.
8. Soper, W. B., and Wilson, J. L.: The detection of pulmonary tuberculosis in 3,000 students entering Yale University. Amer. Rev. Tuberc., 26:548, 1932.

MANAGEMENT OF KIDNEY INJURIES*

With Special Reference to the Value of Intravenous Pyelography

THEODORE H. SWEETSER, M.D.

Minneapolis

I WILL make no attempt at a comprehensive thesis on kidney injuries or their management. There are many sources of information regarding the etiology, pathology, symptomatology, diagnosis and treatment of these injuries. I wish to emphasize only two points: (1) the value of intravenous urography in the diagnosis of kidney injuries; and (2) the value of conservatism, within limits, in their treatment.

Previous to December, 1932, we had regularly used only plain x-ray films of the abdominal region as an aid in the diagnosis of injuries in the region of the kidney. In five cases in this series the plain film was of some value in showing the mass in one renal region obliterating all or part of the corresponding psoas shadow and causing scoliosis toward the opposite side. Bowel distention in some cases made the interpretation of the films difficult. Since the end of 1932, with the advent of safe and efficient solutions in small amounts for intravenous urography, we have used intravenous urography almost routinely as an aid in diagnosis of kidney injury. I wish to show the films from four such cases. The evi-

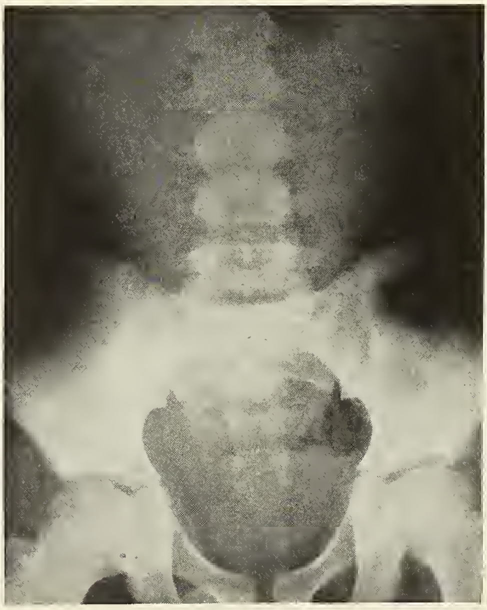


Fig. 1. Partial obscuring of right psoas shadow and a suggestion of scoliosis toward opposite side.

Boy, nine years old, fell fifteen feet. Hematuria. Marked abdominal rigidity and tenderness especially on right side. Pulse rose to 158 on second day. Operation disclosed large hemoperitoneum from peritoneal lacerations over cecum and liver, and complete severing of lower third of right kidney with large hematoma around it. Nephrectomy and repair of peritoneum. Recovery. Home in twenty-three days. (Dr. L. O. Doyle.)

---

*From the Department of Urology, Minneapolis General Hospital, and St. Mary's Hospital, Minneapolis. Read before the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

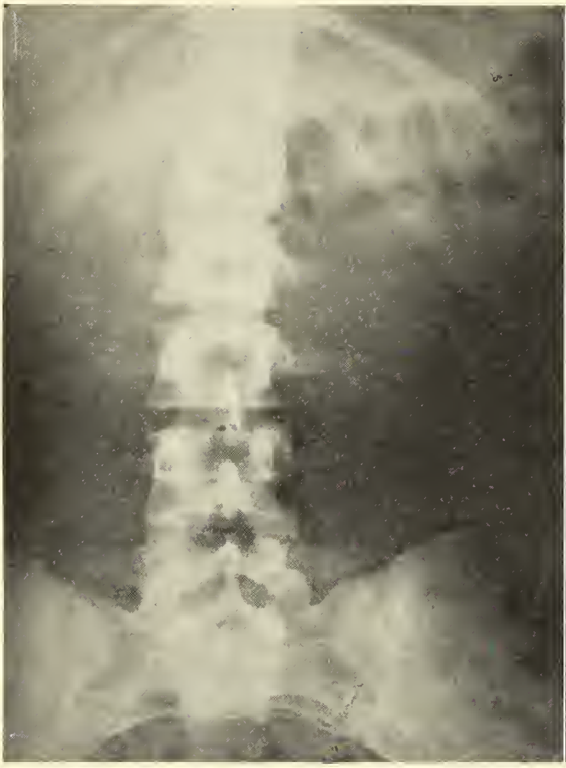


Fig. 2.

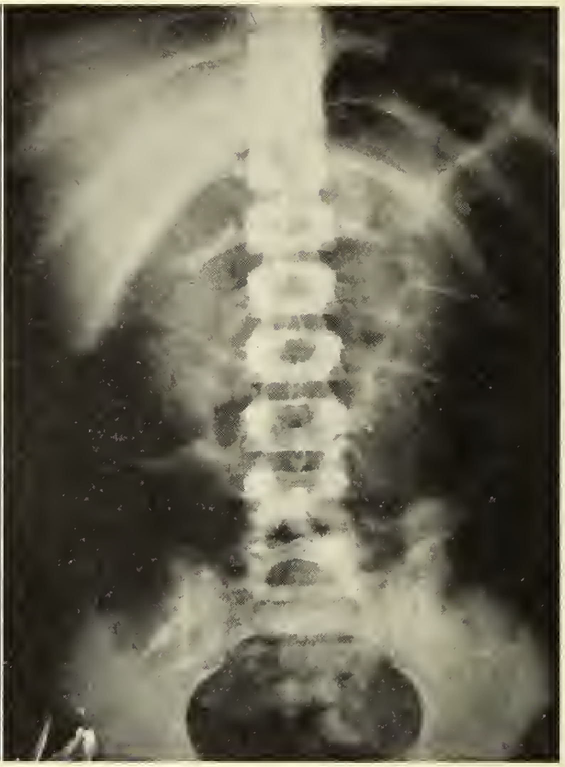


Fig. 3.

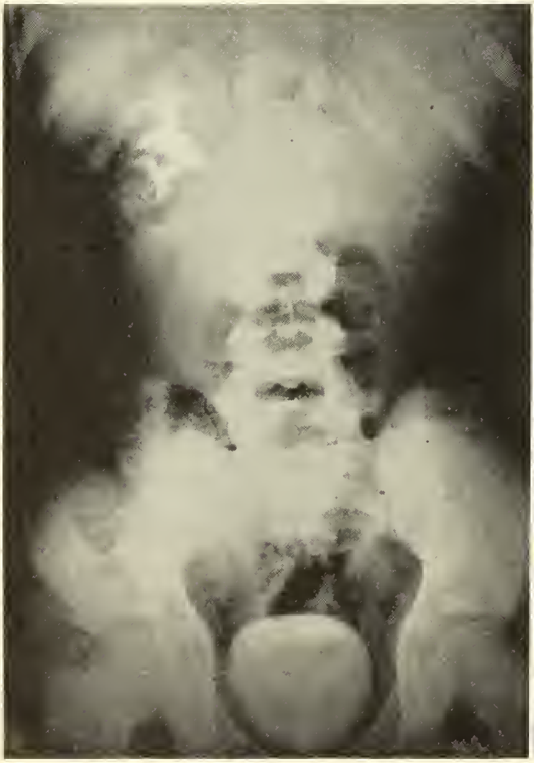


Fig. 4.

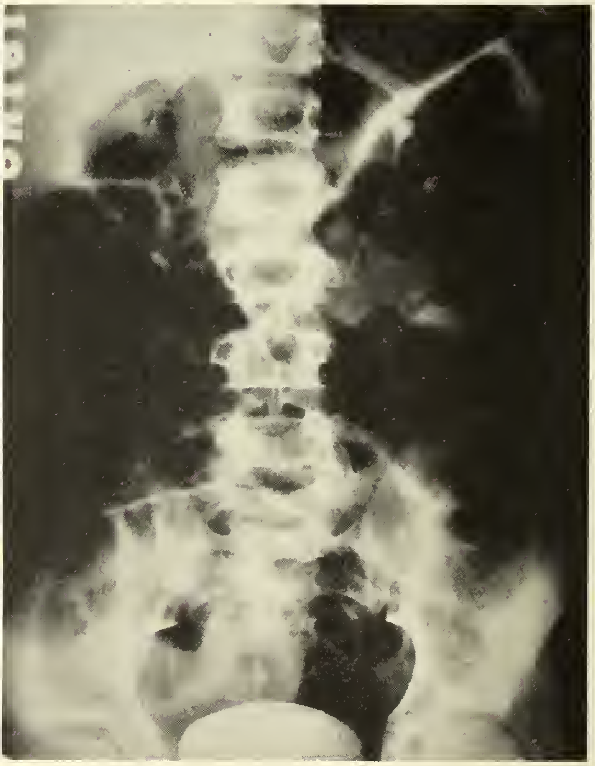


Fig. 5.

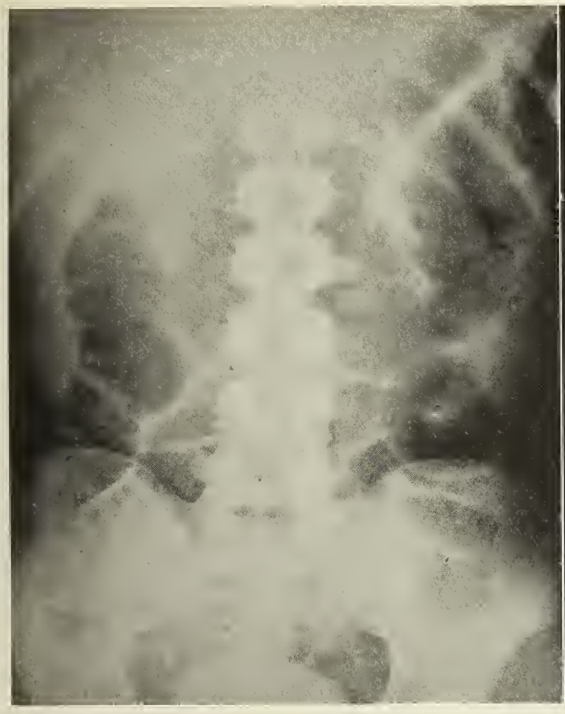


Fig. 6.

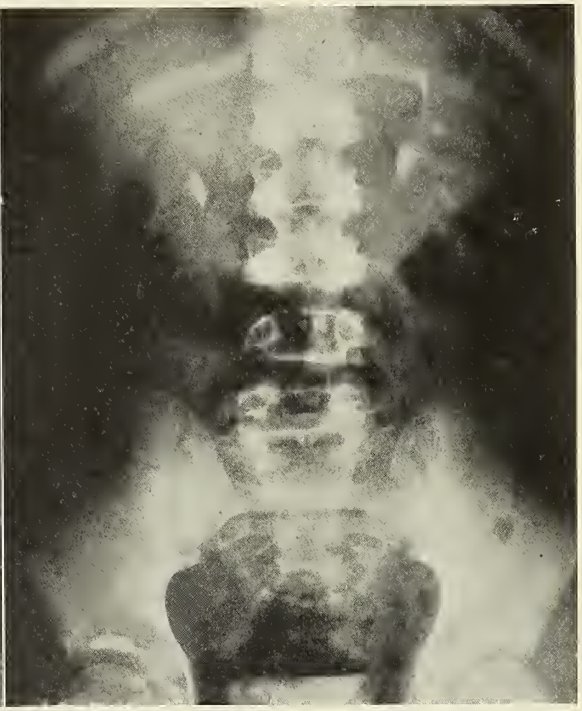


Fig. 7.

Fig. 2. *(left)* Obscuring of left psoas shadow and scoliosis toward opposite side. Film exposed nineteen days after accident.

Student nurse hurt in automobile accident. Hematuria. Pain and rigidity of left side of abodmen and back. Mass was demonstrated in left flank several days after the accident. No operation. Recovery. Home in twenty-two days.

Fig. 3. *(right)* Marked gaseous distention of bowels. In spite of that, there is demonstrable obscuring of right psoas shadow and evidence of soft tissue mass in right kidney region.

Boy, eight years old, fell into open area-way striking right flank on edge. Hematuria. Vomiting. Mild distention. Marked abdominal tenderness especially on right side without rigidity. Shock with pulse 130 and blood pressure 95/65. Improved for three days; then developed hematuria again, and larger mass in right flank with fever. Operation disclosed right perirenal hematoma and almost complete severing of one-third of kidney. Nephrectomy. Recovery. Home fifty-six days after accident.

Fig. 4. *(left)* Intravenous pyelography shows very incomplete irregular filling of left renal pelvis. Film also shows obscuring of left psoas shadow and slight scoliosis towards opposite side.

Boy, ten years old, collided with a post while sliding. Hematuria. Pain and tenderness and some swelling in left flank. Rigidity of lower abdomen. Some shock. Hematuria disappeared but began again in eight days and condition necessitated transfusions and operation, which disclosed left perirenal hematoma and almost complete rupture of kidney. Nephrectomy. Recovery. Home thirty-five days after accident.

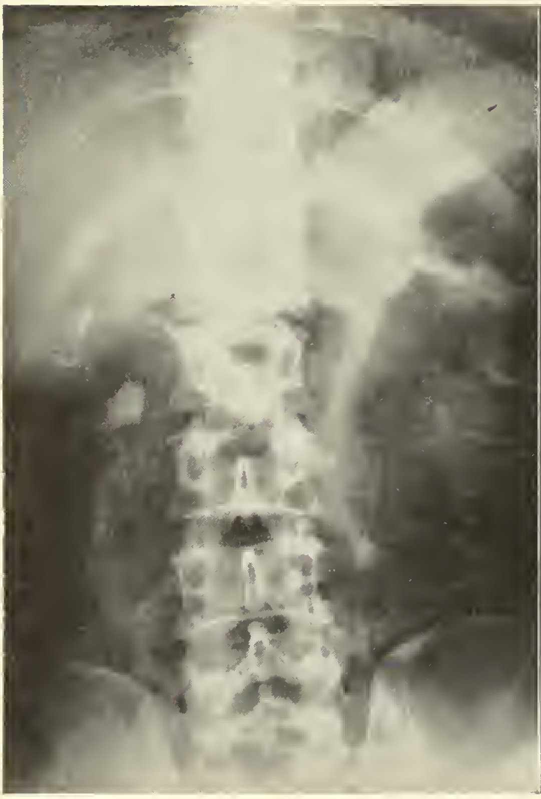
Fig. 5. *(right)* Intravenous pyelography shows almost no dye in right pelvis; the left renal pelvis is incompletely filled and there is possibly some dye out in the renal parenchyma at upper pole and at center. There is a very marked gaseous distention of the gastro-intestinal tract.

Boy, eleven years old, collided with a tree while sliding. Hematuria. Dyspnea. Vomiting. Severe pain in left flank. Rigidity of upper abdomen, principally on right side. No operation. Recovery. Home in seven days.

Fig. 6. *(left)* Intravenous pyelogram shows very incomplete irregular filling of right renal pelvis. Film also shows obscuring of right psoas shadow and scoliosis toward opposite side. Marked gaseous distention of the bowels is also evident.

Boy, ten years old, fell twenty feet from a tree, landing on back and right side. Hematuria. Vomited twice. Abdominal pain. Tenderness and rigidity in right flank with pain on right lumbar percussion. No operation. Recovery. Home in twenty days.

Fig. 7. *(right)* Same case as Figure 6. Film exposed on nineteenth day after accident. Intravenous pyelogram shows much improved filling of right renal pelvis. The psoas shadow is now well defined and the scoliosis has disappeared. There is but little gas in the colon.



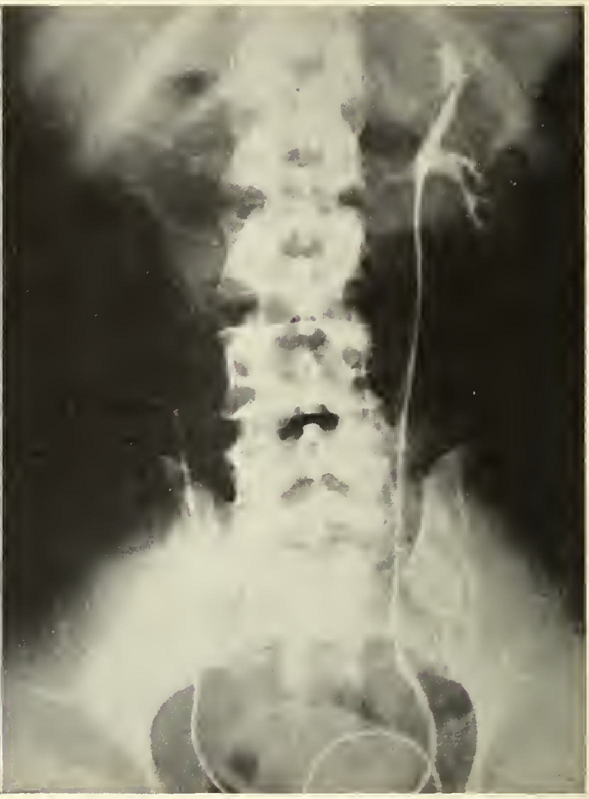


Fig. 8. *(left)* Intravenous pyelography shows incomplete filling of most of left renal pelvis. Film also shows scoliosis towards opposite side. Both psoas shadows are obscured, probably because of the marked gaseous distention of the bowels.

Man, forty-two years old, fell three feet to concrete floor. Hematuria. Pain in left lumbar region and abdomen. Tenderness, rigidity and reflex spasm of left upper abdominal quadrant. Left lumbar percussion pain. Dyspnea with pain on breathing and tenderness over left ribs (fractured). No operation. Recovery. Home in ten days.

Fig. 9. *(right)* Same case as Figure 8. Film exposed on seventh day after accident. Retrograde pyelography shows distinctly an irregular rupture of the parenchyma of midportion of left kidney.

dence consisted of very incomplete and irregular filling of the renal pelvis of the affected kidney, or collections of the dye beyond the calices in the renal parenchyma. In none of our cases was extravasation outside the kidney shown but such might be demonstrated in case of a torn pelvis or ureter. Antecedent disease of the kidney might also be shown and this would serve as a guide to treatment.

The other point which I wish to emphasize is the principle that, in general, conservative treatment of kidney injuries is safest. Each case is an individual problem in judgment, and every such patient requires continuous and close observation; but I feel that, as long as there is any doubt as to the need for operation, it is safer to wait.

Of the twelve patients in this series, five with definite kidney injuries were treated conservatively by complete rest and close observation; all recovered and kept both kidneys. The pyelograms demonstrated definite rupture of the kidney tissue in at least some of them. Five patients had operations within about twenty-four hours after the injury. Two of these had gunshot wounds demanding immediate operation because of associated wounds of other organs; the other three (two with associated injury of other organs) were watched for a few hours until operation became imperative because of rising pulse and other signs of hemorrhage or collapse. Of these five patients who had early operations two died and two had prolonged stormy convalescence. Two of the twelve patients had delayed nephrectomies at which we found almost complete rupture of the kidney with large perirenal hematomas in both cases. In each case operation was forced by recurrence of the hemorrhage, with additional signs of infection in one case. Both recovered.

In deciding to open the kidney space soon after an injury one must recognize the real danger of a serious and perhaps fatal reactivation of hemorrhage after it had been fairly controlled by pressure of surrounding tissues.

Conclusion.—Patients with signs of kidney injury are best treated by absolute rest (sandbags, morphine, etc.) and close, continuous observation, unless or until operation becomes undeniably necessary because of associated intraperitoneal injury or because of persistent or massive hemorrhage, urinary extravasation or infection in the hematoma. Intravenous pyelography is a fairly safe and usually very valuable aid in the diagnosis of kidney injury and should have greater recognition than it has had thus far.

LATE TOXEMIAS OF PREGNANCY*

LEONARD A. LANG, M.D.
Minneapolis

As long as the etiology of the pregnancy toxemias remains unknown, any discussion of them will be involved with a considerable amount of uncertainty and obscurity, resulting from the great variety of individual opinion regarding these diseases.

Medical literature, past and recent, is replete with valuable clinical observations and innumerable laborious experimentations, representing in many instances the work of a lifetime, and yet we are at a loss to know why a certain number of pregnancies will eventuate in a "toxic" condition, jeopardizing the lives of mothers and their babies. We do know, however, that even a so-called normal pregnancy is attended with definite metabolic changes and that there is a very narrow borderline between health and disease in pregnancy, with a considerable strain on all of the vital organs. Most authorities attribute these functional organic alterations to the action of some toxin produced in the fetal or maternal organism, or more recently, to some hypothetical imbalance of the endocrin system.

The many accurate metabolic and physicochemical studies that have been done in normal and pathological pregnancies and the careful observations of the pathology of the various toxemic conditions, although they cannot tell us the actual cause or causes of the disease entities, do give us some leads toward a classification of the toxemias.

A working classification of the late toxemias of pregnancy, which is in use in many clinics today, is as follows:

I. Low Reserve Kidney.
II. Nephritis Complicating Pregnancy.
III. Preeclamptic Toxemia.
IV. Eclampsia.

Although it is obvious that the above is in many respects incomplete and unscientific, yet it gives us an opportunity to group our patients clinically, with a view to answering important questions as to procedure and therapy, and as to the prognosis, both immediate and remote. We will speak later regarding the questionable place that the term "low reserve kidney" has in this classification. But perhaps our greatest difficulty will arise in attempting to differentiate the severe preeclamptic from the nephritic toxemias. In fact, at times, we will not be able to make the correct diagnosis until the patient has come to the end of the puerperium or to autopsy.

I. *Low Reserve Kidney.*—This term was first introduced by Stander and Peckham to denote the mildest type of late toxemia of pregnancy. The condition is probably identical with that previously described as "kidney of pregnancy," "recurrent pregnancy toxemia" (Kellogg), "albuminuria of pregnancy" and certain so-called "nephroses." Dr. J. C. Litzenberg regards this condition, for teaching purposes, as a very mild form of preeclamptic toxemia.

The "low reserve kidney," which comprises about 35% of all cases of late toxemia of pregnancy, is characterized as follows:

1. An elevated blood pressure, rarely exceeding 150 systolic and 90 diastolic.
2. Albuminuria (about 1 gram per liter), which disappears during the puerperium.
3. Mild subjective symptoms, such as head-

---

*Presented before the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

ache, general malaise, etc., may or may not be present.

4. A mild edema, or an excessive gain in weight ("occult edema").

5. Normal blood chemistry and renal function tests.

6. Outstanding is the fact that the patient recovers rapidly after delivery and that her condition does not become aggravated in future pregnancies.

The treatment, which consists of rest in bed, a low protein diet, and restriction of salt in the presence of edema, is usually followed by prompt improvement. If, however, the patient's condition becomes worse, in spite of the above simple therapy, we may feel that we are dealing with a true preeclamptic toxemia or possibly a chronic nephritis.

In managing a supposed case of "low reserve kidney" the most important point to keep in mind is that inasmuch as even the severest form of late toxemia may begin with mild symptoms, every case with any toxic symptom should be closely observed and not classified as "low reserve kidney" until careful study and favorable response to treatment definitely place it in that group. In other words, every case, even with the mildest symptoms, should be considered a preeclamptic toxemia until definitely proven otherwise.

II. *Nephritic Toxemia.*—This is usually seen in women who have had chronic nephritis before conception, occurs in about 25% of all toxemias of pregnancy and is of very grave significance.

It is usually possible to differentiate it from preeclampsia.

1. There may be a history of previous nephritis, or of one or more stillborn premature infants (next to syphilis this type of toxemia is the most frequent cause of intrauterine death).

2. Decreased renal function may be demonstrated.

3. The quantity of urine is more likely to be normal or increased with a low specific gravity, while in preeclampsia it is likely to be decreased.

4. The eye-grounds show retinal hemorrhage and albuminuric retinitis in severe cases, while arteriolar spasm and edema is all that is usually seen in the preeclamptic.

5. We are likely to have nitrogenous retention demonstrated by an elevated non-protein and blood urea nitrogen (especially in the severe cases) which usually shows up earlier.

6. The behavior of the various abnormal findings after treatment has been instituted is sometimes helpful.

7. In 10 per cent of the cases the diagnosis cannot be made until late in the puerperium, when nephritis is diagnosed if the blood pressure and urine do not return to normal.

The prognosis for the mother is grave, because pregnancy accentuates the preexisting nephritis and because the condition tends to recur in subsequent pregnancies.

Stander and Peckman, in 236 cases, found a maternal mortality of 42.5 per cent within five years after the diagnosis had been made. The fetal mortality is around 20 per cent, due largely to deficient nourishment, caused by placental infarction.

The treatment, in general, is identical with that outlined for preeclamptic toxemia, induction of labor being seriously considered if a definite diagnosis is made and the patient has not responded to treatment.

Chronic nephritics are poor risks for pregnancy and should be advised against it.

III. *Preeclamptic Toxemia.*—This frequent type of late toxemia occurs several times in every 100 cases of pregnancy. It is characterized in general by a high or rising blood pressure, albuminuria and edema, with undue weight gain. The mild or moderately severe cases are usually amenable to the treatment outlined for the "low reserve kidney" patient, plus the use of sedatives, cathartics (such as magnesium sulphate) and diuretics to control the edema.

Careful prenatal care, with frequent and routine examination of urine and blood pressure, as well as observations in weight gain, once a month during the first six months, every two weeks until the ninth month, and every week during the last month, will detect the earliest signs and symptoms of the disease, when simple therapy, as mentioned above, will often ward off a serious preeclampsia and permit the pregnancy to go on, uncomplicated, to term.

The term "*preeclampsia*" denotes the very severe toxemia which is the forerunner of eclampsia, and which if not treated properly, almost always terminates in eclampsia. Most frequently its onset is insidious with rising blood pressure, followed by albuminuria, edema of the face and extremities, and a decrease in urinary output. Occasionally it has a very acute onset with intense headache, epigastric pain, or visual disturbances such as double vision or amaurosis. Often, when first seen, the patient appears very ill and may be torpid or somnolent, or may even show twitchings of the extremities. Such a patient will have a blood pressure of around 190 systolic and 110 diastolic. The urine, which will be markedly decreased in amount (200 to 300 c.c. in twenty-four hours), will show 2 to 20 grams of albumin per liter, casts, and red blood cells in the severe cases. Examination of the eye-grounds may demonstrate arteriolar changes with spastic narrowing of the lumen in the early cases, which may become fixed in the severe cases. Retinal edema and hemorrhages into the retina are not uncommon, and occasionally detachment of the retina is observed. Diffuse retinitis of the albuminuric type is very rare and is usually considered to be diagnostic of nephritic toxemia.

In the treatment of preeclampsia, it is essential that the patient be put to bed in the hospital, where she is given a quiet, darkened room. Visitors are excluded. It is our custom to place the patient on a strict milk diet of one or more quarts a day, depending on the edema. Fluids are not restricted except in the presence of edema.

Sedatives are given—barbitals, chloral or morphin—depending on the severity of the toxemia. The blood pressure is taken several times a day and is recorded by graph. The intake and output are carefully observed and recorded. The urine is examined daily and the amount of albumin is quantitatively determined by the Esbach method. Blood chemistry studies are made with special attention to non-protein-nitrogen, blood urea nitrogen, uric acid, blood chlorides, blood sugar and CO_2 combining power. The ocular fundi are examined on admission and at intervals thereafter. The bowels are kept free by moderate doses of magnesium sulphate, or by castor oil, if at or near term. If edema is marked and especially if there are signs of cerebral irritation, magnesium sulphate is given intravenously, 20 c.c. of a 10 per cent solution every four hours for six doses, or glucose in solutions of 10 to 20 per cent. Very occasionally, where the blood pressure is exceedingly high, venesection of 750 to 1000 c.c. is resorted to before considering the termination of pregnancy.

If symptoms do not abate under treatment, the outlook is serious and eclampsia may supervene. We feel that a continued daily output of 5 grams of albumin per liter, or a blood pressure around 200, justifies emptying the uterus. The sudden appearance of amaurosis or epigastric pain, drowsiness, muscular irritability, or ocular fundi changes, may be similar justification.

Labor is induced in these cases, usually by bougies or bag, depending largely upon the condition of the cervix. The second stage is shortened by forceps or version, depending upon the station of the head. Chloroform is never used, nitrous oxide gas being the usual anesthetic.

IV. *Eclampsia.*—This occurs about once in 500 labors (Williams) and makes up about 12 per cent of the toxemias of pregnancy. It is defined as "an acute toxemia in pregnant, parturient or puerperal women, accompanied by clonic or tonic convulsions, during which there is loss of consciousness, followed by coma, and frequently resulting in death." Eclampsia may occur without convulsions, the patient showing typical pathological findings at autopsy.

Eclampsia occurs during the last trimester of pregnancy, occurring more often as full term is approached. It is more frequent in primipara (70 to 80 per cent), in twin pregnancy and in hydramnios. There is some evidence that it varies with the seasons, with a greater frequency during the spring months. This is one of the arguments of those who adhere to the infectious theory of eclampsia.

In its clinical course eclampsia is identical with preeclamptic toxemia, developing progressively in a few days or weeks until convulsions occur. But occasionally it may make its appearance very suddenly, with no warning other than a severe headache or epigastric pain (fulminant eclampsia).

The convulsions are commonly preceded by premonitory signs, but rarely may occur without warning. Eclampsia, because of the convulsions, must be differentiated from epilepsy, hysteria, uremia and certain chemical poisonings, such as from strychnin, phosphorous and nitrozenzol. The convulsions which may vary in number from 1 to 100 or more, are followed by a profound coma lasting from a few minutes to several days. The patient is not conscious during a convulsion and may not even remember the attack. When death occurs during an attack, it is usually due to edema of the lungs or apoplexy; post-partum deaths may be due to aspiration pneumonia or sepsis.

The urine in eclampsia, as in preeclampsia, is diminished or may be entirely suppressed. Casts are found, and red blood cells are usually found. Albuminuria is almost constantly present, varying in quantity from 10 to 40 grams per liter, falling as a rule to less than 1 gram per liter, within forty-eight hours after delivery.

The blood chemistry in eclampsia has been studied by a host of observers. In general we may say that the outstanding features are an increase in the uric acid and a decrease in the CO_2 combining power (as low as 10 volume per cent in fatal cases), which latter demonstrates that an acidosis is almost constantly present. Blood sugar is usually increased; and blood chlorides are increased as a rule, if edema is marked. There is no appreciable increase of the non-protein or blood urea nitrogen unless there is considerable kidney damage terminally.

The pathology in eclampsia is rather clear-cut. Renal changes consist of degenerative changes in the vessels and in the epithelium of the glomeruli and convoluted tubules. Dr. E. T. Bell has described a uniform thickening of the basement membrane, causing narrowing of the capillaries. Dr. Williams considered the changes in the liver to be absolutely characteristic. The liver on cut section has a characteristic mottled appearance, due to irregularly shaped, reddish and whitish areas of hemorrhagic necrosis which on microscopic examination are found to involve the periphery of the individual lobules and the portal spaces. The brain may show edema, thrombosis or hemorrhage, while in the heart, degenerative processes in the myocardium may be in evidence.

The prognosis in eclampsia is serious, with a maternal mortality ranging between 10 per cent and 35 per cent and a fetal mortality of about 40 per cent. The prognosis is particularly bad in the face of any of the following:

1. A systolic blood pressure above 200.
2. Ten or more grams of albumin per liter.
3. Decreased urinary output or anuria.
4. Prolonged or large number of convulsions.
5. Prolonged coma.
6. Continued pulse rate above 120.
7. High or continuous temperature.
8. Absence of edema.
9. Dry skin.
10. Apoplexy.
11. Paralysis.
12. Edema of the lungs.

It is usually said that intrauterine death improves the outlook for the mother.

Any discussion of the treatment of eclampsia must give first place to the prophylaxis of eclampsia—and that is proper prenatal care. This makes possible the discovery and treatment of preeclamptic toxemia, which as we have shown, is ushered in by a definite array of symptoms and signs in a vast majority of cases. Indeed, it is evident that the real aim in treating preeclampsia is to prevent eclampsia.

On the other hand, the active or curative treatment of eclampsia, once it has manifested itself, must remain empirical and unsatisfactory, so long as we are ignorant of the etiology. For this reason authorities differ, dividing into two diametrically opposed schools of thought—the radical and the conservative. The radicals advocate emptying the uterus as soon after the first convulsion as possible. Several decades ago this was accomplished by accouchement forcé; that is, the forcible dilatation of the cervix, whatever its stage of effacement or dilatation. Then, vaginal cesarean section (or better, vaginal hysterotomy) which was first described by Dührssen in 1896, was the vogue. Now, radical treatment generally means abdominal cesarean section. At first thought, this would seem to be the logical way to quickly empty the uterus, but the results following the employment of cesarean section in eclampsia are very poor. As Williams put it: "Of one thing concerning the treatment of eclampsia I am convinced and that is that the worst possible treatment consists of the routine employment of cesarean section."

The conservative school, on the other hand, claim that the immediate operative emptying of the uterus is not only unnecessary, but harmful. Their aim is to symptomatically control the elevated blood pressure, convulsions and other toxic symptoms; to induce labor as conservatively as possible where and when it is indicated; and to avoid traumatic delivery as much as possible by not interfering until the cervix is completely dilated. Various methods have been devised to accomplish this, of which the following are the outstanding:

1. The Stroganoff method which aims primarily at rest and freedom from external stimuli, and sedatives in the form of morphin and chloral hydrate, at regular specified intervals.

2. Venesection, the oldest method, consists of controlling the excessive blood pressure by the withdrawal of 750 to 1,000 c.c. of blood.

3. The Dublin method, consisting of starvation, elimination by gastric and colonic lavage, and submammary infusion of sodium bicarbonate solution.

4. The magnesium sulphate method which aims at controlling cerebral edema and toxic symptoms by the intravenous or intramuscular injection of magnesium sulphate.

5. The liver extract method or the injection of Heparmone intramuscularly at intervals until symptoms are controlled.

6. Irving of Boston introduced plasmaphoresis—withdrawing large quantities of blood, centrifuging to remove the plasma and re-introducing the red cells suspended in normal saline solution.

Statistics show that essentially as good results follow the employment of any one or any combination of the first four methods, provided no attempt at delivery is made until the cervix is fully dilated. The worst results follow cesarean section or other surgical procedures.

The plan of treatment at the University Hospital is a combination of a modified Stroganoff procedure plus other conservative methods.

While each case is individualized, the following is a sketchy outline of our treatment:

1. The patient is put to bed in a quiet, darkened room, with a private nurse in attendance. Absolute quiet is essential.

2. A hypodermic of morphin sulphate, gr. ¼, is given on admission.

3. One hour after admission, 30 grams of chloral, per rectum.

4. Three hours later the hypodermic of morphine sulphate, gr. ¼, is repeated. (Not more than ½ gr. in twenty-four hours.)

5. Seven, thirteen, and twenty-one hours after admission, 30 grs. of chloral hydrate per rectum.

6. The patient is carefully watched to prevent inspiration of mucus, fluid, etc.

7. She is examined medically and obstetrically, with the least possible disturbance (under nitrous oxide gas if necessary).

8. Large quantities of water are given if the patient is not markedly edematous and is conscious. If unconscious, 500 c.c. of 5 per cent glucose are given intravenously twice a day.

Our chief reliance is put upon this modified Stroganoff procedure, but occasionally we use other conservative methods as adjuvants.

9. Venesection of 750-1000 c.c. is employed, but rarely, and usually only in those cases where there is cardiac embarrassment or impending pulmonary edema.

10. Magnesium sulphate (20 c.c. of a 10 per cent solution every four hours for six doses) is sometimes used in the face of marked edema, very high blood pressure and when the patient is responding poorly to our usual treatment.

11. Hypertonic glucose is used at times, in cases of oliguria, anuria, cerebral edema and definite acidosis.

This treatment usually controls convulsions in the mild or moderate cases, and some days later, in favorable cases, labor occurs spontaneously. In most cases, however, the improvement is only temporary and therefore we usually induce labor after the primary improvement. In any event, no attempt at delivery is made until the cervix is completely dilated.

If, however, convulsions and coma continue after conservative measures and the patient is in labor—

(a) If the cervix is fully dilated, the patient is delivered as soon as possible by forceps or version, depending upon the station of the head.

(b) If the cervix is partially dilated and readily dilatable, the dilatation is completed manually and the child is then also delivered by forceps or version, depending on the station of the head.

Cesarean section is not undertaken in eclampsia unless there are other indications for the operation, and then not with the idea of curing the eclampsia. Plass has well shown the danger of radical methods in the treatment of eclampsia. In a study of 10,000 cases, of which 4,607 were treated radically, the mortality was 21.7 per cent, while in 5,976 which were managed conservatively, the mortality was 11.1 per cent.

In a disease as rare and as tragic as this, none of us, in the short space of a lifetime, is going to see a sufficient number of cases upon which to base an individual judgment, but this large series with its sharp contrast should help us in forming an opinion as to what type of treatment to employ.

Finally, we must remember that our duties are not at an end when we have followed a toxemia of pregnancy to a successful delivery. Many toxic cases have some degree of kidney damage. Therefore, every such patient should be carefully observed until the blood pressure becomes normal, albumin and casts have disappeared from the urine, and the kidney function is restored to normal. This may require weeks or months. Such observation not only guarantees the greatest possible health for the patient, but is also the basis for the advisability and prognosis of future pregnancies.

THE CARE OF THE ALLERGIC CHILD*

A. V. STOESSER, M.D., and E. SHAPERMAN, M.D.

Minneapolis

SEVERAL years ago the suggestion was made that one day a week be set aside for the special care of the children with allergic disorders attending the Pediatric Out-patient Department of the University Hospital. During a six-month trial period the necessary materials for studying these patients were obtained, and the old cases were treated with satisfactory results. Following this, the Pediatric Allergy Clinic was established as a definite part of the Out-patient service.

New cases were admitted to the clinic after July 1, 1932. From that date to July 1, 1934, two years later, 169 children were referred to the clinic from the 2,771 new admissions of the General Pediatric Out-patient service. Of this number, twenty-eight children were not considered to be allergic, and they were referred back. The remaining 141 cases, making up about 5 per cent of the total admissions, were accepted for study and treatment.

The purpose of this paper is to describe the experiences which we had during the past two years in taking care of the allergic children. The 141 cases were distributed as follows: eczema, 43 (30.5 per cent); allergic coryza, 10 (7.1 per cent); hayfever, 19 (13.5 per cent); asthmatic bronchitis, 5 (3.5 per cent); bronchial asthma, 46 (32.6 per cent); urticara, 15 (10.7 per cent); gastro-intestinal allergy, 3 (2.1 per cent). All of these allergic disorders may be grouped under that subheading of natural or human hypersensitiveness entitled atopy or atopic hypersensitiveness. In making this statement the following classification of allergy is referred to:

I. Anaphylaxis or anaphylactic hypersensitiveness (acquired)
    A. In animals—experimental
    B. In man—anaphylactic shock in a previously sensitized individual
    C. Drug anaphylaxis in man

II. Natural or human hypersensitiveness
    A. Serum allergy (or sickness)
    B. Drug allergy (or idiosyncrasy)
    C. Atopy or atopic hypersensitiveness (hereditary)
        1. Allergic dermatitis or eczema
        2. Allergic coryza due to
            a. Inhalants
                (1) Animal emanations
                (2) Pollens (hayfever or pollinosis)
                (3) Powders and perfumes
            b. Foods and drugs
            c. Bacterial products of infection
        3. Bronchial asthma due to
            a. Inhalants
            b. Foods and drugs
            c. Bacterial products
        4. Other allergic conditions
            a. Urticaria (and angioneurotic edema)
            b. Gastro-intestinal allergy (food allergy)
            c. Allergic migraine
            d. Purpura (Henoch's)
            e. Some cases of epilepsy

---

*From the Department of Pediatrics, University of Minnesota. Presented before the Northwestern Pediatric Society at the annual meeting of the Minnesota State Medical Association, Duluth, Minnesota, July 16, 1934.

- D. Serum and drug shock in the atopic individual

III. Hypersensitiveness in infection (acquired)
- A. Bacterial allergy or hyperergia
  - 1. Tuberculosis
  - 2. Allergy has been considered in
    - a. Rheumatic fever
    - b. Scarlet fever
    - c. Nephritis
    - d. Lobar pneumonia
- B. Fungous and parasitic infections may produce allergic reactions.

The name atopy, which means "a strange disease" was coined by Coca, a leading American investigator in the field of allergy. He included all those clinical forms of hypersensitiveness which occur so far as is known only in human beings and which are subject almost entirely to inheritance.

The first clinical forms included in this category were hayfever and bronchial asthma. Later eczema was added. More information led to the inclusion of allergic coryza, and then urticaria and gastro-intestinal allergy were added. An attempt is now being made to include allergic migraine, purpura (Henoch's) and some cases of epilepsy.

The substance to which the atopic individual responds in an abnormal way are called "atopens," and they may be proteins or non-proteins. These individuals react with specific bodies which may be found in the blood of nearly all cases. Whether these bodies which have been called atopic reagins are true antibodies developed immunologically under antigen stimulation or physiological products like the natural hemoagglutinins and hemolysins is not known.

In atopic hypersensitiveness heredity seems to play an outstanding part. It has been observed that by the tenth year of life atopic symptoms have appeared in 89 per cent of the atopic offsprings under a bilateral hereditary influence, in 35 per cent of those subject to a unilateral influence, and in only 20 per cent of those with a negative family history. Asthma and related conditions are transmitted as a Mendelian dominant. The greater the heredity the earlier are symptoms manifested, and the earlier in life the individual becomes sensitive the greater the tendency to multiple sensitization.

The atopic children were handled in the allergy clinic in a rather simple manner. Nothing elaborate was attempted. An effort was made to follow some definite program in searching for the cause of the allergic disorder. First of all, a very complete history was obtained. It was observed that in many instances a good history was really the key to success in the treatment. Special emphasis was placed on the time of onset, the outstanding symptoms, the course of the disease from month to month, or year to year, the previous allergic disorders, the associated or concomitant allergic disorders, and the family history. A search was made for allergic disorders among immediate members of the family and blood relations. Several history outlines were tried in obtaining good records but none was found to be quite as satisfactory as that of Rowe presented in his monograph entitled "Food Allergy." His outline as applied to asthma is as follows:

"A. Past History. 1. Onset of asthma. Age? Month or season of the year? Gradual or sudden? Was there a history of catarrhal congestion in the nose or eyes, repeated or chronic, bronchitis or wheezing before asthma began? Did any acute infection or operation precede asthma? If eczema, urticaria or angioneurotic edema occurred prior to or after the onset of asthma, state the time of onset and duration of each.

"2. Course of asthma. Describe the asthmatic state from its inception to the present time with reference to the frequency and duration of attacks. Were attacks initiated by nasal congestion, sneezing, pharyngeal irritation, nasal, conjunctival or pharyngeal itching, fever, irritability, nervousness, nausea or vomiting? Was asthma intermittent or continuous? Describe the attacks themselves in relation to duration and severity of wheezing, coughing, amount and type of expectoration, fever and time required for recovery. Has any relief occurred from change of climate?

"3. Concomitant allergic symptoms: Recurrent head colds, croup, seasonal or perennial hayfever, urticaria, angioneurotic edema, pruritus, eczema, bronchitis, headaches, migraine, gastro-intestinal symptoms, including canker sores, buccal membrane films, heavy breath, coated tongue, globus hystericus, anorexia, distention, pyrosis, regurgitation, belching, nausea, vomiting, cyclic vomiting, epigastric heaviness or distress, abdominal pain or soreness in the upper left, lower left, epigastric, umbilical or midlower areas of the abdomen, colicky or constant pain, radiation of pain, mucous colitis, constipation, colonic soreness, proctitis, pruritus ani, bladder distress, chafing of thighs, irritation of the vulva, weakness, fatigue, mental confusion, irritability, depression. Describe the course and degree of any of these in the patients.

"4. Infancy: How long breast-fed? First bottle, its contents and whether it was continued? When were other foods added? Was there any colic, gastro-intestinal disturbances, pylorospasm, food distastes or disagreements or feeding difficulties?

"5. Food dislikes or disagreements: Do any foods definitely disagree or cause any symptoms? Are there any dislikes for foods?

"6. Environmental contact and exposure: Are any definite symptoms noticed from house dust, animal contacts, various types of pillows or mattresses, furs or special furnishings? Are there any effects from changes of temperature or weather? What are the occupations of various members of the family? Are there any barns, chicken-yards, animals, flower gardens, trees or forests near the house? Is the house old or new? Has it hardwood floors or carpets? Is it damp or musty? What sort of furnishing and carpets are there?

"B. Family History. Was there a history of seasonal or perennial hayfever, recurrent head colds or bronchitis, bronchial asthma, urticaria, angioneurotic edema, eczema, bilious attacks, recurrent headaches or migraine, gastro-intestinal symptoms similar to those enumerated above in the father, mother, brothers, sisters, maternal or paternal grandfather, grandmother, aunts or uncles? Were there any other chronic diseases in these relatives?"

Each patient received a complete physical examination with special emphasis being placed on a careful observation of the nose and throat. A note was made as to whether the tonsils and adenoids had already been removed. A record was also kept of the number of sinus or antrum punctures the patient had received. Roentgenograms of the paranasal sinuses and the lungs were obtained in all cases with allergic disorders of the respiratory tract. Blood studies were made, and the differential counts were closely followed. As a whole very few outstanding physical defects were found among the allergic children, the only exception being the barrel-chests with emphysema present in some with chronic asthma.

Cutaneous tests were next applied. The glycerinized fluid extracts of the various atopens or allergens were used. The material is furnished in capillary tubes, there being enough of the fluid extract in each tube for one test. In this way there is no danger of contamination or spilling which occasionally occurs with the dry extracts. There is also no need for the hypodermic needles, syringes and cleansing solutions which are so essential in performing the intradermal tests.

The tests were applied by the pressure-puncture method. This was found to be the best method for infants and small children, especially when they would not remain quiet. The skin was cleansed with alcohol or ether, and after evaporation, the extract was expelled from the glass capillary tubes upon the cleansed skin at intervals of about four centimeters. Holding a sterile sewing needle nearly parallel with the skin, four oblique pricks or shallow punctures were made through the epidermis by pressing the point of the needle through each drop of extract. A new needle was used for each test. The punctures were confined to an area not more than three millimeters in diameter.

Sufficient fluid extract to produce a positive reaction in susceptible children was carried into the skin by these multiple punctures, and so in a few minutes the excess fluid on the surface of the skin was lightly wiped off. A similar test was carried out with a control glycerine solution and only those reactions in the test sites which were distinctly greater in intensity than that resulting from the control test were considered positive. The positive reactions (urticarial wheal surrounded by a zone of erythema) usually appeared in sensitive patients in 20 to 30 minutes.

From several hundred allergens, only eighty were chosen to represent our set of cutaneous tests. This was considered to be a sufficient number for the satisfactory testing of allergic children. The various allergens were divided into three groups: ingestants, inhalants, and pollens. The complete list follows. The ingestants or food allergens are grouped according to botanical classifications, and the pollens have been assembled under their various groups.

When the results of the cutaneous tests were negative or unsatisfactory, the so-called elimination of trial diets were tried. In the older infant and in the young child, these diets were often very valuable. Numerous diets eliminating various foods were used. It was found that in the majority of the cases one or more of the following foods were responsible for the allergic manifestations: milk, cheese, egg, whole wheat, white potato, chocolate, tomato and orange. If the removal of these foods did not give satisfactory results, then diets eliminating beef, oatmeal, rye, peas, beans, spinach or apple were tried.

Some of the children who came to the allergy

Ingestants
1. Beef
2. Pork
3. Lamb

4. Egg
5. Milk
6. Cheese

7. Codfish

8. Chicken

9. Wheat
10. Oat
11. Rye

12. Cornmeal
13. Sweet Corn
14. Barley
15. Rice

16. Carrot
17. Celery

18. Potato
19. Tomato

20. Lima Bean
21. Navy Bean
22. String Bean

23. Green Pea
24. Peanut
25. Squash

26. Asparagus
27. Onion

28. Cabbage
29. Cauliflower

30. Lettuce

31. Beets
32. Spinach
33. Buckwheat
34. Rhubarb

35. Pear
36. Apple

37. Apricot
38. Peach
39. Prune
40. Plum

41. Lemon
42. Orange
43. Grapefruit

44. Grape
45. Raisin
46. Pineapple
47. Banana

48. Tapioca
49. Chocolate

Inhalants
1. Cat Dander
2. Cow Dander
3. Dog Dander
4. Horse Dander
5. Sheep Dander

6. Feathers (mixed)

7. Orris Root
8. Cotton Seed
9. Flax Seed
10. Kapok Seed
11. Silk
12. Pyrethrum
13. Tobacco
14. Glue
15. House Dust

Pollens

Trees
1. Poplar
2. Ash and Oak

Grasses
3. Sweet Vernal
4. Timothy
5. Redtop
6. June Grass
7. Orchard Grass
8. Perennial Rye
9. Rye Pollen
10. Johnson Grass

Plantain
11. Common Plantain

Dock or Sorrel
12. Yellow Dock

Alfalfa-Clover
13. Alfalfa

Pigweeds
14. Redroot
15. Careless Weed
16. Western Water Hemp
17. Spiny Amaranth

Russian Thistles
18. Russian Thistle
19. Lambs Quarters

Sage-Wormwoods
20. Sage Brush
21. Pasture Sage
22. Mugwort

Ragweeds
23. Combined Ragweed
24. Western Ragweed
25. Cocklebur
26. Marsh Elder

clinic had already been placed on various trial diets by the family physician. The results had not been very good. In a number of these cases, it was found that the parents were not making a complete elimination of the offending food. In one instance, although the mother did not give her child eggs, she was feeding him macaroni or spaghetti about every other day. She had been told to place the child on an absolutely egg-free diet. In another case, rye bread containing wheat flour was being eaten in fairly large amounts by a child who was supposed to be on a wheat-free diet. From experiences such as these, it became apparent that success in connection with the trial diets depended in many instances upon the thoroughness with which they were carried out by the parents. A great deal of time was therefore taken in explaining each diet in detail, emphasizing especially all sources of error.

The diagnostic procedures mentioned above were applied to the majority of the children studied in the clinic. For economy of space and for the sake of clearness, the data obtained from all the histories, physical examinations, cutaneous tests, and elimination diets together with the treatment which was instituted has been condensed into eight tables which are practically self-explanatory. They will now be briefly considered in their natural order.

Table I represents the data obtained from the children with eczema. There was an equal distribution as far as sex was concerned. The majority of the patients came to us before the sixth year of life, and in four-fifths of the patients the onset was early, that is in the first year of life. There were very few associated allergic disorders and the family history was negative in more cases than positive. The physical examination usually revealed nothing outstanding beside the eczema. The cutaneous tests were positive in a little over half the children. Although there were many positive tests, only a certain number of them were of definite value in the treatment of eczema (Table VI). In only one instance was a contactant considered responsible for the eczema.

The group with negative cutaneous tests was placed on elimination or trial diets. After the offending food or foods were located, every ef-

TABLE I. ECZEMA—43 CASES (30.5 PER CENT)

1. Sex: Male	21
Female	22
2. Age at First Visit	
Below 1 year	12
1 to 5 yrs., incl.	17
6 to 10 yrs., incl.	7
11 to 15 yrs., incl.	7
3. Age at Onset	
Below 1 year	35
1 to 5 yrs., incl.	3
11 to 15 yrs., inc.	2
4. Previous Allergic Disorders	0
5. Associated Allergic Disorders	
Bronchial Asthma	1
Hayfever	1
6. Family History	
Positive	16
Negative	27
7. Physical Examination	
Overweight	2
8. Eosinophile Diff. Count	
Below 5 per cent	32
5 to 10 per cent	9
Over 10 per cent	2
9. Cutaneous Tests	
Positive	25
Negative or refused	18
10. Treatment	
Positive skin tests	
Removal from diet of	
Egg	2
Egg, wheat and milk (powdered milk used)	2
Egg, wheat and chocolate	1
Egg and milk	1
Wheat	2
Wheat and oatmeal	1
Milk	2
Tomato and orange	1
Orange and chocolate	1
Chicken and cheese	1
Removal of silk	1
Referred into hospital	8
Treatment unsuccessful	2
Negative or no skin tests	
Elimination diets used with removal from diet of	
Egg	3
Egg and wheat	2
Egg, wheat and milk	1
Egg and potato	1
Milk	1
Milk and potato	1
Tar alone very effective	2
Referred into hospital	3
Treatment unsuccessful	4

NOTE: In this table and the succeeding ones the numerals in each column indicate the number of cases.

TABLE II. ALLERGIC CORYZA—10 CASES (7.1 PER CENT)

1. Sex: Male	6
Female	4
2. Age at First Visit	
Below 1 year	0
1 to 5 yrs. incl.	3
6 to 10 yrs. incl.	3
11 to 15 yrs. incl.	4
3. Age at Onset	
Below 1 year	0
1 to 5 yrs. incl.	6
6 to 10 yrs. incl.	4
4. Previous Allergic Disorders	
Infantile Eczema	3
5. Associated Allergic Disorders	
Bronchial Asthma	2
Chronic Eczema	1
6. Family History	
Positive	8
Negative	2
7. Physical Examination	
Large tonsils	1
Ear infection	1
8. Tonsils (at first visit)	
Present	3
Removed	7
9. Maxillary Sinus Roents.	
Positive	3
Negative	7
10. Eosinophile Diff. Count	
Below 5 per cent	7
5 to 10 per cent	0
Over 10 per cent	3
11. Cutaneous Tests	
Positive	3
Negative	7
12. Treatment	
Skin tests of value	
Symptom free after the removal of	
Egg and feathers	1
Cat Dander	1
Skin tests of no value and elimination diets used	
Improvement followed after the removal from diet of	
Egg	2
Egg and wheat	1
Egg, wheat and milk	1
Wheat	1
Wheat and potato (sinus drainage)	1
Skin tests negative and no improvement with the use of the elimination diets	2

TABLE III. HAYFEVER OR POLLINOSIS—19 CASES (13.5 PER CENT)

1. Sex: Male	18
Female	1
2. Age at First Visit	
Below 1 year	0
1 to 5 yrs. incl.	2
6 to 10 yrs. incl.	12
11 to 15 yrs. incl.	5
3. Age at Onset	
Below 1 year	0
1 to 5 yrs. incl.	12
6 to 10 yrs. incl.	7
4. Previous Allergic Disorders	
Infantile Eczema	2
Bronchial Asthma	2
Urticaria	1
5. Associated Allergic Disorders	
Bronchial Asthma	4
Bastro-intestinal	2
Urticaria	1
6. Family History	
Positive	12
Negative	7
7. Physical Examination	
Large tonsils	2
Ichthyosis	1
8. Tonsils (at first visit)	
Present	12
Removed	7
9. Maxillary Sinus Roents.	
Positive	12
Negative	7
10. Eosinophile Diff. Count	
Below 5 per cent	9
5 to 10 per cent	8
Over 10 per cent	2
11. Cutaneous Tests	
Positive	16
Unsatisfactory	1
Refused	2
12. Treatment	
Desensitization—good results	
Grasses	1
Weeds (ragweed group)	5
Grasses and weeds	2
Desensitization in progress the first time	3
Desensitization refused	4
Moved from Minnesota to	
Washington State	1
Canada	1
No treatment (cases mild and wish to see if symptoms repeat)	2

TABLE IV. ASTHMATIC BRONCHITIS—5 CASES (3.5 PER CENT)

ACUTE BRONCHITIS WITH ASTHMA

1. Sex: Male	3
Female	2
2. Age at First Visit	
Below 1 year	0
1 to 5 yrs. incl.	0
6 to 10 yrs. incl.	0
11 to 15 yrs. incl.	1
3. Age at Onset	
Below 1 year	1
1 to 5 yrs. incl.	3
6 to 10 yrs. incl.	1
4. Previous Allergic Disorders	0
5. Associated Allergic Disorders	
Eczema	1
6. Family History	
Positive (eczema case)	1
Negative	4
7. Physical Examination	
Upper respiratory infection with acute bronchitis	5
Acute tonsillitis	1
8. Tonsils (at first visit)	
Present	5
Removed	0
9. Maxillary Sinus Roents.	
Positive	1
Negative	4
10. Eosinophile Diff. Count	
Below 5 per cent	3
5 to 10 per cent	2
11. Cutaneous Tests	
Positive (eczema case)	1
Negative	4
12. Treatment	
Skin tests of no value	
The following symptomatic treatment for acute bronchitis carried out	5
Rest	
High vitamin diet	
Ephedrine inhalant (diluted to 0.2 - 0.4%)	
Steam inhalations	
Cough sedatives (codein)	
Belladonna	
Expectorants such as ipecac and pot. iodide	
Ephedrine with sedatives	
Tonsils and adenoids also removed in one case	
Gradually with each attack of bronchitis the asthma became less and less severe	

TABLE V. BRONCHIAL ASTHMA—46 CASES (32.6 PER CENT)

1. Sex: Male	29
Female	17
2. Age at First Visit	
Below 1 year	0
1 to 5 yrs. incl.	10
6 to 10 yrs. incl.	20
11 to 15 yrs. incl.	16
3. Age at Onset	
Below 1 year	10
1 to 5 yrs. incl.	27
6 to 10 yrs. incl.	8
11 to 15 yrs. incl.	1
4. Previous Allergic Disorders	
Infantile Eczema	16
Hayfever	6
Urticaria	2
5. Associated Allergic Disorders	
Hayfever	8
Urticaria	6
Chronic Eczema	4
6. Family History	
Positive	32
Negative	14
7. Physical Examination	
Barrel-chest	8
Malnutrition	7
Large tonsils	5
Adolescent goiter	1
8. Tonsils (at first visit)	
Present	33
Removed	13
9. Maxillary Sinus Roents.	
Positive	25
Negative	21
10. Eosinophile Diff. Count	
Below 5 per cent	20
5 to 10 per cent	16
Over 10 per cent	10
11. Cutaneous Tests	
Positive	33
Negative or refused	13
12. Treatment	
Positive tests of value	
Removal of foods	
Wheat	2
Milk	1
Grape	1
Removal of inhalants	
Horse dander	3
House dust	2
Cat dander	1
Feathers	1
Feathers and dog	1
Orris root	1
Fish glue	1
Removal of foods and the inhalants	
Egg and feathers	1
Wheat, oatmeal, peas and feathers	1
Desensitization	
Grasses	2
Weeds (ragweed)	4
Grasses and weeds	1
Removal of foods and desensitization	2
Positive tests of no value	
Pot. iodide and belladonna gave the most relief	2
Tonsillectomy and adenoidectomy with sinus drainage	2
Moved to Washington State	1
All forms of treatment unsuccessful	3
Tests negative or refused	
Removal of	
Egg	1
Egg, wheat, wool and feathers	1
House dust	1
Tonsillectomy and adenoidectomy	2
All forms of treatment unsuccessful	8

fort was made in watching closely that these foods were kept entirely out of the child's diet from day to day. At the same time the general health of the patient was considered. The elimination diet was checked carefully in order to be sure that the infant or child received the proper number of calories, a sufficient amount of the minerals such as calcium and phosphorus, and an adequate supply of vitamins. In some instances, milk could gradually be returned to the diet in the form of evaporated milk or a powdered milk. The so-called non-allergic milks were very poorly taken.

In two cases, there was marked improvement from the external application of crude coal tar (2 per cent) in zinc paste. The patients which were referred into the hospital ranged in age from six months to eighteen months. They were selected as ideal cases for a special study of the blood lipids which was being conducted in the hospital. They did not represent failures on our part. There were, however, in all six cases which yielded to none of the various methods of treatment instituted. They were chiefly older children who had had eczema for many years.

The allergic disorders with predominant nasal manifestations are considered in Tables II and III. There is allergic coryza with its characteristic perennial history, and hayfever or pollinosis with its strong seasonal occurrence. The incidence of these disorders appears to be greater in the males than in the females. Although

TABLE VI. DISTRIBUTION OF SKIN SENSITIVENESS TO THE VARIOUS ALLERGENS

Eczema	A	B	Hayfever	A	B	Asthma	A	B			
									House Dust	8	2
									Horse Dander	7	3
Egg	14	6	Comb. Ragweed	15	10	Wheat	7	4	Feathers	6	4
Wheat	10	5	Cocklebur	14	10	Oat	5	2	Sheep Dander	4	..
Milk	9	4	Marsh Elder	11	10	Egg	5	1	Cat Dander	2	1
Oat	6	..	West. Ragweed	10	10	Peanut	5	..	Dog Dander	2	1
Barley	3	..				Cornmeal	4	2	Kapok Seed	2	..
Spinach	3	..	Pasture Sage	9	..	Pork	4	..	Silk	2	..
Rice	2	..	Sage Brush	7	..	Sweet Corn	3	2	Cotton Seed	1	..
Rye	2	..	Mugwort	6	..	Rice	2	1	Flax Seed	1	..
Potato	2	..				Barley	2	..	Orris Root	1	1
Green Pea	2	..	Sweet Vernal	7	4	Milk	2	1	Fish Glue	1	1
Tomato	2	1	June Grass	6	4	Chicken	2	..	Tobacco	1	..
Orange	2	2	Orchard Grass	6	4	Beef	2	..	Comb. Ragweed	10	6
Chocolate	2	2	Timothy	5	4	String Bean	2	..	Sage Brush	6	1
Chicken	1	1	Redtop	5	4	Potato	2	1	Orchard Grass	5	4
Lamb	1	..	Johnson Grass	5	4	Cabbage	2	..	Redroot	5	..
Pork	1	..	Perennial Rye	4	..	Rye	1	..	Careless Weed	5	..
Beef	1	..	Rye Pollen	3	..	Buckwheat	1	..	Sweet Vernal	4	4
Cornmeal	1	..				Codfish	1	..	Redtop	4	4
Cheese	1	1	Alfalfa	2	..	Lamb	1	..	June Grass	4	4
Buckwheat	1	..				Navy Bean	1	1	Lambs Quarters	4	..
Navy Bean	1	..	Water Hemp	2	..	Green Pea	1	1	Pasture Sage	4	1
String Bean	1	..	Spiny Amaranth	2	..	Lettuce	1	..	Johnson Grass	3	3
Apple	1	..				Spinach	1	..	Water Hemp	3	..
Prune	1	..	Russian Thistle	2	..	Cauliflower	1	..	Russian Thistle	3	..
Peanut	1	..	Lambs Quarters	2	..	Asparagus	1	..	Cocklebur	3	3
						Peach	1	..	Marsh Elder	3	3
Silk	2	1	Poplar	2	..	Pear	1	..	Timothy	2	2
Flax Seed	1	..				Pineapple	1	..	Yellow Dock	2	..
Kapok Seed	1	..				Grape	1	1	West. Ragweed	2	..

A—Number of positive cutaneous tests for each allergen.
B—Number of times the positive reaction of definite assistance in treatment.

allergic coryza was more or less equally distributed through the various age periods, the cases of pollinosis were largest in number during the early school years. However, the onset of the disorders dated back in almost two-thirds of the children to the preschool period. This is interesting in view of the fact that there has been a feeling that nasal allergy is not so important during this early age period. Infantile eczema was present in some instances as a previous allergic disorder, while bronchial asthma was most important as an associated allergic disorder. The family histories were positive more often than negative. Significant was the observation that in many instances one or both parents gave a history of nasal allergy.

A tonsillectomy had been performed in many of the cases of allergic coryza. Some of the hayfever patients had also had their tonsils removed. In each instance there was no improvement. In fact, some of them became worse. The maxillary sinus roentgenograms were definitely more positive in the children with pollinosis than in those with allergic coryza. This may have been due to the fact that the reaction of the nasal mucosa to the allergens was definitely greater in the hayfever cases. As a result the mucosa of the sinuses was also probably markedly swollen giving on roentgenogram examination the appearance of infected sinuses. A few of these subjects had had sinus or antrum punctures before coming to the allergy clinic. The results were of course unsatisfactory.

The cutaneous tests were chiefly negative in the children suffering with allergic coryza. We were therefore forced to use the elimination diets and had fairly good success. In fact the response to the trial diets was considered one of the most significant observations of the two year study. On the other hand, in the subjects with pollinosis the cutaneous tests were usually positive with a great deal of accuracy. Desensiti-

TABLE VII. URTICARIA—15 CASES (10.7 PER CENT)

1. Sex: Male	6
Female	9
2. Age at First Visit	
Below 1 year	2
1 to 5 yrs. incl.	5
6 to 10 yrs. incl.	3
11 to 15 yrs. incl.	5
3. Age at Onset	
Below 1 year	4
1 to 5 yrs. incl.	6
6 to 10 yrs. incl.	3
11 to 15 yrs. incl.	2
4. Previous Allergic Disorders	
Infantile Eczema	1
5. Associated Allergic Disorders	
Gastro-intestinal	3
6. Family History	
Positive	5
Negative	10
7. Physical Examination	
Large tonsils	1
Many dental caries	1
8. Tonsils (at first visit)	
Present	13
Removed	2
9. Maxillary Sinus Roents.	
Positive	0
Negative	15
10. Eosinophile Diff. Count	
Below 5 per cent	13
5 to 10 per cent	2
11. Cutaneous Tests	
Positive	3
Negative	8
Unsatisfactory	4
12. Treatment	
Skin tests of value	
Symptom free after the removal of tomato, carrot, orange, apple, chocolate	1
Skin tests of no value, negative or unsatisfactory	
Elimination diets used with relief after removal of	
Egg and wheat	1
Egg, wheat, potato, tomato, orange and chocolate	2
Egg, milk and spinach	1
Milk	1
Tomato	2
Tomato and orange	1
Removal of wool	1
Avoidance of heat (hot baths)	2
Alkaline ash diet and alkali	1
Treatment unsuccessful	2

zation relieved the majority of the children who received this form of treatment. The pollens used in producing the state of hyposensitization are listed in column B under hayfever in Table VI. Two patients were sensitive to so many grasses and weeds that desensitization was not attempted but instead arrangements could fortunately be made to move these children to other parts of the continent. Here they obtained relief.

In Tables IV and V is condensed all the data obtained from a thorough review of the cases who were admitted to the clinic with a diagnosis of asthmatic bronchitis and bronchial asthma. The males, it will be observed, predominated. The asthmatic bronchitis appeared chiefly during the preschool period of childhood and four-fifths of the cases of bronchial asthma had their onset before the sixth year of life although many of them did not come for medical care until later in childhood. With nothing significant observed as far as previous and associated allergic disorders and family history are concerned in connection with asthmatic bronchitis, it was interesting to note the high incidence of infantile eczema as a previous allergic disorder and of hayfever and urticaria as associated allergic disorders in the bronchial asthma cases. Heredity seemed to play a very important part in that over two-thirds of the patients with bronchial asthma had a positive family history. In fact, here appeared an allergic disease in which there was a high incidence of bilateral hereditary influence with a corresponding early onset of symptoms in the offsprings.

The so-called asthmatic bronchitis cases all had attacks of upper respiratory infections. Very often the naso-pharyngitis extended to the bronchi. The acute bronchitis was accompanied by a great deal of difficulty in breathing. Some of the children became cyanotic for short periods of time. The cyanosis alarmed the parents and it was the chief reason for the child's visit to our clinic.

A thorough examination revealed nothing significant outside of an infection of the respiratory tract. This infection frequently was quite mild in the nose and throat, but more severe in the bronchi. The roentgenograms of the maxilliary sinuses were usually negative. The cutaneous tests were also negative and therefore of no definite assistance in the treatment.

TABLE VIII. GASTRO-INTESTINAL ALLERGY—3 CASES (2.1 PER CENT)

1. Sex: Male	0
Female	3
2. Age at First Visit	
Below 1 year	0
1 to 5 yrs. incl.	1
6 to 10 yrs. incl.	0
11 to 15 yrs. incl.	2
3. Age at Onset	
Below 1 year	0
1 to 5 yrs. incl.	1
6 to 10 yrs. incl.	2
4. Previous Allergic Disorders	0
5. Associated Allergic Disorders	0
6. Family History	
Positive	1
Negative	2
7. Physical Examination	
Large tonsils	1
8. Tonsils (at first visit)	
Present	3
Removed	0
9. Maxillary Sinus Roents.	
Positive	0
Negative	3
10. Eosinophile Diff. Count	
Below 5 per cent	2
5 to 10 per cent	1
11. Cutaneous Tests	
Positive	1
Negative	2
12. Treatment	
Skin tests of value	
Symptom free after the removal of Cheese	1
Skin tests of no value and elimination diets used	
Improvement followed after the removal from diet of	
Milk and wheat	1
Wheat and chocolate	1

Before treatment the subjects had vomiting and abdominal pain or colic. One case complained of headaches.

The treatment was essentially that of acute bronchitis. Nothing specific was carried out. In the one patient with rather severe attacks of acute tonsillitis, the tonsils and adenoids were removed. This was followed by marked improvement. In spite of the lack of any specific treatment, all the children, as they grew older, had fewer asthmatic attacks in association with their respiratory infection. In a few instances, we found that the asthma had entirely disappeared during our two year period of observation.

The most common physical findings in the asthmatic children were barrel-chest and malnutrition. The barrel-chest was found in patients in which the restriction of the free passage of air through the bronchi was more or less a constant thing. Malnutrition existed in those cases in which the children were so fatigued by the repeated asthmatic attacks that they had very little desire to eat. In fact some of them felt better if they ate only small meals. The average duration of the asthma in the cases with physical defects was seven and one-half years while in the children with no defects, the period was four years.

The roentgenogram studies were of little help in the asthma cases. On the other hand, the cutaneous tests, which were positive in a little over two-thirds of the patients, were of value in the majority of the children. The incidence of positive reactions of definite assistance in the treatment can be observed in Table VI under asthma in column B. In a certain number of cases, foods were responsible for this allergic condition and they had to be removed completely from the diet. In other instances, inhalants caused the attacks. Still another group reacted to both foods and inhalants, and there were also children who had hayfever and quite severe asthma. They were sensitive to pollens and desensitization gave very good results. In two cases, the removal of certain foods from the diet plus desensitization was necessary in order to give complete relief. One boy was sensitive to so many foods, inhalants and pollens, especially the latter, that arrangements were made for his removal to Washington State. Improvement followed this change in environment in that he now has only occasionally an asthmatic attack.

A small number of children had positive tests which were of no value in the treatment (Table V). Two of these patients were greatly relieved by medication, two had very large tonsils, and improved after tonsillectomy and adenoidectomy with sinus drainage, and three cases refused to respond to any form of treatment. They are still under observation.

On the other hand, in the children with negative cutaneous tests, the trial or elimination diets and a careful study of the child's environment were of some value. Three patients were relieved. Two cases with large tonsils had less asthma after tonsillectomy and adenoidectomy. All forms of treatment were unsuccessful in eight children, making a total of eleven cases (24 per cent) in which progress was not good. Thirty-five children (76 per cent) were however definitely helped.

A review of the cases of urticaria and gastrointestinal allergy is presented in Tables VII and VIII. The two allergic disorders have many things in common. The females predominated in both diseases. The family histories were more often negative than positive. The maxillary sinus roentgenograms were negative. Cutaneous tests indicated specific sensitivity in only a small number of patients. In fact, the tests were of value in treatment in only one case for each disease. The elmination diets were of greater assistance. Many children improved when they were used. Two cases of urticaria failed to respond to any form of treatment.

The blood studies made in all the allergic disorders were carefully recorded. Special attention was given to the eosinophile differential counts. They were, however, found to vary a great deal. In some cases, the count was rather high during the allergic reaction and low after it had subsided. In other instances it was low during the height of the allergic manifestation and high shortly after improvement had occurred. A few children showed no change in the count during or after the allergic disorder. The patients with asthma had usually the highest counts, while the cases of eczema had very little elevation.

Summary and Conclusions

1. A clinical review of the study made and the treatment carried out in 141 children with allergic disorders which were referred to the Pediatric Allergy Clinic over a two year period has been presented.

2. The allergic diseases encountered were eczema, allergic coryza, hayfever, asthmatic bronchitis and bronchial asthma, urticaria and gastrointestinal allergy. They belong to that section of a newer classification of allergy entitled natural or atopic hypersensitiveness characterized by a strong hereditary tendency.

3. Our experience in the care of the allergic children has indicated that there were a large number of cases which received satisfactory relief. In obtaining this result, no elaborate methods of diagnosis were used, but instead a few rather simple procedures were followed. All were considered of equal importance and are as follows:

   a. A very complete history
   b. Cutaneous tests
   c. Elimination or trial diets

4. Treatment involved the thorough removal of the offending foods from the diet, or the irritating inhalants from the child's environment. Pollen allergy responded very well to proper and careful desensitization.

5. A small number of patients required surgical treatment in order to obtain relief.

6. Success depended upon the avoidance of all haste in the diagnosis and treatment. Delays in relieving the child were often necessary because histories had to be retaken, cutaneous tests repeated, and trial diets rearranged. A rather exhaustive search was conducted for the offending allergen or allergens, and an effort was made to avoid placing the patient on some form of drug therapy, thereby dismissing the search.

CASE REPORTS

UNUSUALLY LARGE BILATERAL RENAL CALCULI

E. W. EXLEY, M.D.

Minneapolis

Numerous reports of unusually large renal and ureteral calculi appear throughout the literature. Many of these calculi have been removed at operation or have been recovered at the autopsy table, and the literature contains a record of their dimensions and weights. I wish to report the following unique occurrence of unusually large bilateral renal calculi unaccompanied by any severe symptom complex until relatively late in its course. Unfortunately the patient was not operated upon and an autopsy was not obtained.

Mrs. O., a white woman aged sixty-five, was first seen on December 28, 1934. She appeared to be somewhat confused mentally and a detailed history was not easily obtained. She stated that she had noted an indefinite abdominal pain for the past year or two. During the winter of 1933-34 these pains became more severe and constant, but she could not say whether or not the pain was worse on one side or the other. In April, 1934, she became aware of a mass in the left flank which was gradually becoming more tender. In July she first noted hematuria which has been more or less constant since that time. This hematuria was unaccompanied by any aggravation of her urinary symptoms. As well as the patient could remember she had urinary frequency and nocturia twice a night for at least eight years. Since the appearance of her hematuria in July she had been under the care of a chiropractor. She had some vomiting during the two months previous and she thought that she had lost considerable weight. She had had no operations or previous serious illnesses.

Examination revealed an adult female who had apparently undergone a considerable loss of weight. The physical examination was negative excepting for the abdomen which showed large bilateral masses in both flanks. These masses were nodular and tender to palpation, the right being the less tender of the two. Both masses moved with respiration and showed marked tenderness to Murphy percussion. The measurements of these masses were: left 24 cm. vertical x 14 cm. horizontal; the right 22.5 cm. vertical x13 cm. horizontal.

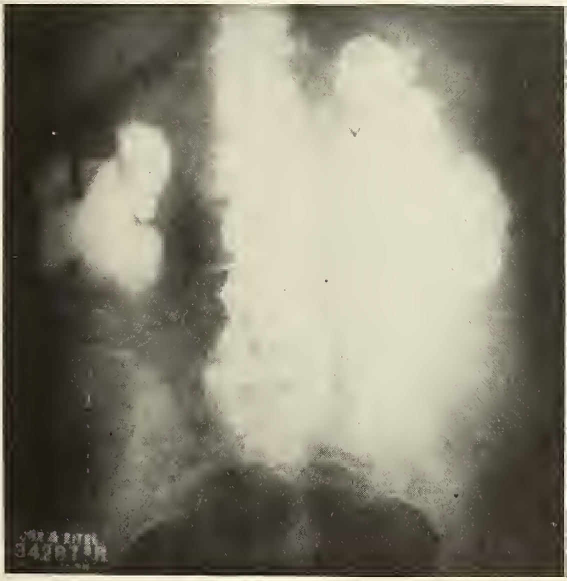


Fig. 1. X-ray showing large calculi with shadows in the course of the ureter on the left and a cluster of shadows overlying the lower pole of the right kidney.

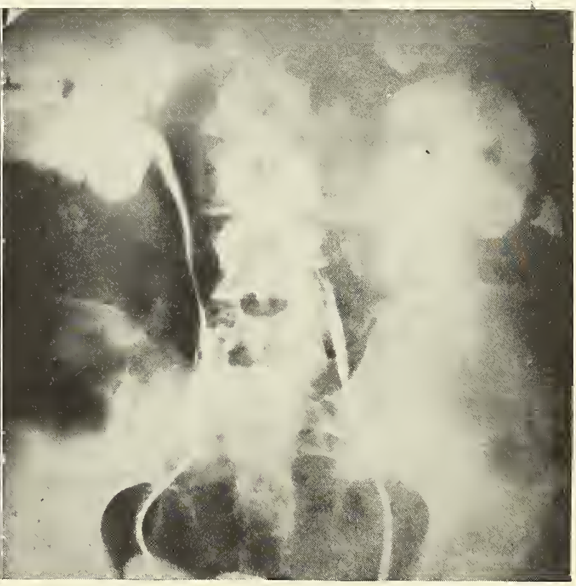


Fig. 2. Pyelogram of the right kidney showing complete calculous filling of the renal pelvis and the dilated calyces. No media is seen to have passed the shadows lying in the course of the left ureter.

The laboratory examination showed that the urine contained 3 plus pus and 2 plus blood and a heavy trace of albumin. The blood urea nitrogen was 30.1 mgs. per 100 c.c. of blood.

X-ray revealed bilateral calculi shadows in both kidney regions. The kidney shadows themselves were markedly enlarged, the left one being the larger of the two. The calculous shadow on the left seemed to be separated into two parts. Another lower shadow in this region suggested the possibility of the presence of a ureteral calculus in the left upper ureter. On the right side there was a small cluster of shadows overlying the lower pole of the kidney.

Cystoscopic examination was done on December 29, 1934. There was a fourth degree cystocele. Large areas of bullous edema were seen on the trigone and surrounding the location of both ureteral meati. Spurts of urine containing debris were seen to issue from this region on either side, but no indigocarmine was noted after intravenous injection from either side.

A second ureteral meatus was searched for on the left side but none was found. After the insertion of a No. 6 ureter catheter on the right side a faint trace of indigocarmine was seen. Pale urine was collected from the catheter in the left ureter, but no dye was seen. Bilateral pyelograms were attempted. These showed the right renal pelvis to be completely filled by a lobulated calculous. The uretero-pelvic juncture was apparently not dilated. The small cluster of shadows over the lower pole was suggestive of gallstones by their arrangement although they may have been renal in origin. On the left side no shadow casting media could be introduced beyond a shadow which appears to be a calculus obstructing the ureter. One gathered the impression that there was a second ureter either branched or completely duplicated which was not catheterized or injected. No shadow casting media was introduced into the pelvis proper.

The renal tumors were visible when the patient was in the sitting position, but attempts to demonstrate these by photographic means were unsuccessful.

In view of the cachectic condition of the patient no surgical intervention was advised. She returned to her home and died one month later from what was reported as being uremia. An autopsy was not obtained.

AN UNUSUAL PHARYNGO-ESOPHAGEAL FOREIGN BODY AND ITS REMOVAL*

HERMAN J. MOERSCH, M.D.

Rochester, Minnesota

The different foreign bodies that may become lodged in the esophagus are legion and are limited only by their inability to pass through the oral cavity. Nor are people immune to such accidents because of their sex or age. The comparative rarity with which foreign bodies become lodged in the esophagus, however, is a commentary on the marvelous workings of the deglutitive apparatus rather than of the human intellect. While most such accidents occur as the result of individual carelessness and improper mastication, they may be quite unavoidable. The following case is of special interest as it belongs to this latter group, and there was difficulty in extracting the foreign body.

Report of Case

A girl, four months of age, was brought to the clinic December 20, 1934, for the extraction of a foreign body which had become lodged in the pharynx and upper end of the esophagus. Several hours before, the patient had been lying in her crib happily watching her brother and sister disarticulate a metallic toy. Having completed their labors, the patient's mouth presented an inviting place for the disposal of one of the pieces of the toy, besides giving the baby a more personal interest in the proceedings. Inasmuch as this article would not readily disappear, it was pushed back into the throat by manual means in spite of the associated screams and slight vomiting of blood-streaked mucus from the unfortunate recipient of these ministrations. The child was seen soon after by the home physician who ordered an immediate roentgenogram of the chest. This revealed the foreign body which had become lodged in the back of the pharynx and upper end of the esophagus. The patient was then referred to the clinic.

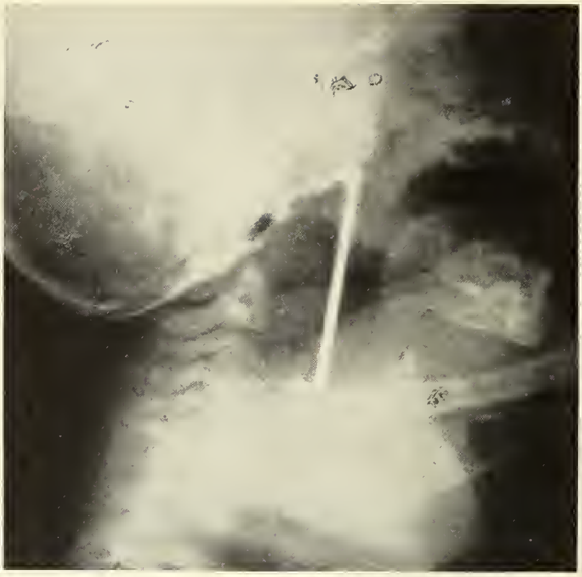


Fig. 1. The roentgenogram made in the lateral position showing situation of the foreign body in the nasopharynx and esophagus.

At examination on admission the child seemed comfortable and there were no unusual physical findings. Roentgenograms revealed that the piece of metal extended from the nasopharynx down into the upper portion of the esophagus (Fig. 1), and on laryngoscopic examination, it could be visualized in the midline of the pharynx. Because the hook on the upper end of this piece of metal was so firmly embedded in the posterior wall of the nasopharynx, it was impossible to extract it by direct traction without trauma. It was therefore first necessary to force the whole piece slightly upward and anteriorly into the nasopharynx to dislodge the sharp hooked upper end. When this was done it was then gently drawn downward into the esophagus until the upper prong or hook became exposed in the pharynx. As it was not possible to withdraw this rather long piece of metal from this position, and because of the danger of the lower angulated end tearing the esophagus, it was gently pushed down until it was almost completely in the esophagus. An esophagoscope was then introduced into the esophagus and around this foreign body, which could then readily be extracted within the protecting walls of the esophagoscope. The child made a rapid and uneventful recovery.

---

*From the Division of Medicine, The Mayo Clinic, Rochester, Minnesota.

EDITORIAL

MINNESOTA MEDICINE
OFFICIAL JOURNAL OF THE MINNESOTA STATE MEDICAL ASSOCIATION
Published by the Association under the direction of its Editing and Publishing Committee

EDITING AND PUBLISHING COMMITTEE
J. T. CHRISTISON, Saint Paul A. S. HAMILTON, Minneapolis
E. M. HAMMES, Saint Paul T. A. PEPPARD, Minneapolis
WALTMAN WALTERS, Rochester

EDITORIAL STAFF
CARL B. DRAKE, Saint Paul, Editor
W. F. BRAASCH, Rochester, Assistant Editor
C. A. MCKINLAY, Minneapolis, Assistant Editor

Annual Subscription—$3.00. Single Copies—$0.25
Foreign Subscriptions—$3.50.

The right is reserved to reject material submitted for editorial or advertising columns. The Editing and Publishing Committee does not hold itself responsible for views expressed either in editorials or other articles when signed by the author.

Classified advertising—five cents a word; minimum charge, $1.00. Remittance should accompany order.

Display advertising rates on request.

Address all communications to Minnesota Medicine, 2642 University Avenue, Saint Paul, or 324 Fourth Avenue South, Minneapolis. Telephones: Nestor 1381 and Dupont 1013.

BUSINESS MANAGER
J. R. BRUCE, Saint Paul

Volume 18 MAY, 1935 Number 5

Scarlet Fever Incidence

For the past seven years scarlet fever has been conspicuous in this territory by its comparative absence and mildness. A perusal of the Public Health reports shows that last year there was more scarlet fever in the southeastern states and this year the disease has shown epidemic form in Wisconsin, Illinois, Indiana, Iowa, and Minnesota. Some of the far western states also show a decided increase in the incidence of this disease. It is interesting, too, that measles, which attained epidemic proportions in the eastern and southeastern states last year, has been even more decidedly epidemic in character than scarlet fever this year throughout the middle and western states. Minnesota has had much more than its usual quota of mumps and German measles this year. Contagious diseases, like hard times, move in cycles. Whether scarlet fever tends to become more malignant in epidemic form remains to be seen.

Health departments are hard put to it when an epidemic of scarlet fever develops. The schools in Milwaukee were closed. Children under seven were prohibited from attending school in Minneapolis with the feeling that this measure would tend to check contagion as more than 60 per cent of Minneapolis cases were among children under this age. Undoubtedly school association favors contagion even though the jump in incidence of contagious diseases following the opening of school each fall may in part be accounted for by readier detection of cases. Movies, however, afford almost as favorable a setting for contagion as schools.

The coincident prevalence of German measles is blamed for some of the spread of scarlet fever. Parents and even the attending physician too often have confused German measles and a mild attack of scarlet fever and have failed to report the mild infection.

The present epidemic has again raised the question of active scarlet fever immunization, the point on which the pediatricians and general practitioners seem to differ. Although Dick states that reactions occur in only 10 per cent of inoculations and are not harmful, these reactions are sufficient to prevent its widespread use. The naked vaccine now available is far from the last word in the problem of universal vaccination for the prevention of scarlet fever. The Dicks have been subject to severe criticism in their attitude toward further investigation in the refinement of their vaccine, made possible by patent rights. Any patent right which interferes with further research directed toward developing a scarlet fever toxoid free from the disadvantages of the present product savors of commercialism, is likely to postpone the development of a satisfactory vaccine, and is not in keeping with the spirit of the medical profession.

Doubtless in time scarlet fever vaccination will be developed so that universal vaccination will be universally recommended by members of the medical profession and epidemics of the disease will be no more.

Lucretia Wilder Memorial

The tragic accident which resulted in the death of Miss Lucretia Wilder at the University of Minnesota Medical School in February has prompted a committee consisting of Dean Ford, Dean Scammon, Dean Lyon, Dr. Wangensteen and Professor Hal Downey to initiate the raising of a sum of money as a memorial to the name of this enthusiastic research student.

A graduate of West High School, Minneapolis, and the holder of a B.S. degree from the University of Minnesota, Miss Wilder was taking graduate work, majoring in hematology under Dr. Downey, when the accident occurred.

Working on a thesis involving leukocytosis in general, Miss Wilder had found that by injecting aleuronat into the pleural cavity of rabbits more leukocytes would appear in the pleural cavities of rabbits than were circulating in the blood at any one time. Strange to say, this experiment produced very little change in the blood picture. This led to a study of the bone marrow, the spleen, lymph nodes and liver, from the standpoint of the distribution of leukocytes in tissues and organs. It then became desirable to compare these results with those obtained by injecting organisms. A strain of staphylococci was obtained from the bacteriology department for this purpose.

Miss Wilder attempted to do one of these injections alone late in the evening of February 19, received a scratch, and some of the culture got into the wound. By the next morning she was extremely ill and showed evidence of septicemia. The course of the infection was so rapid that death occurred at noon, February 22.

Several hundred dollars have already been raised by the committee in charge, but it is hoped that the sum will exceed $1,000. Whether the fund will be used for a scholarship prize or a memorial tablet will be determined later. Contributions of any size may be sent to Dean E. P. Lyon, 136 Medical Service Building, at the University of Minnesota, Minneapolis.

Editor's Dilemma

An explanation seems in order so that the possibility of misunderstanding on the part of contributors may be obviated. For economic reasons the size of MINNESOTA MEDICINE was considerably reduced in 1934. This and a greater number of papers presented at our last State Medical Association meeting has resulted in a delay in publication of all papers submitted.

The publication of papers presented before the Minnesota Academy of Medicine and the Minneapolis Surgical Society has always produced a problem. Logically the paper presented before either of these societies should be available in the same number in which the discussions are published in the Transactions. This necessitates the publication of the paper either in the Transactions or elsewhere in the same number of the journal. Both of these alternatives have been used in the past. The inclusion of such papers in the Transactions makes the Transactions bulky and although these papers are indexed in our yearly index, they do not appear in the Index Medicus. Therefore, some authors have expressed reluctance in having their papers so published. To deliberately publish one of these papers in the main body of the same issue is giving preference to articles presented before these two societies from the time standpoint and if there is one criticism the Editing and Publishing Committee and the Editor have tried consistently to avoid, it has been that of showing favoritism.

For the information of our contributors it may be stated that at the last meeting of the Editing and Publishing Committee the Editor was instructed to adhere as closely as possible to the publication of papers in the order of their presentation and submission for publication. This rule will be adhered to religiously and only slight modification necessitated in the make-up of any particular number of the journal or by delay in receiving papers will affect the regulation. Case reports will not be included in this rule.

A further enlargement of the journal would make prompt publication of papers possible. Doubtless as business conditions improve, the size of the journal will be gradually increased. Until such time the Editor begs the indulgence of contributors whose papers are being delayed in publication.

Extension Courses

The Committee on Hospitals and Education of the State Association is looking for suggestions that will make more effective the post-graduate study program for physicians throughout the state. To this end it is suggested that those who have constructive criticism of courses communicate with the committee through the State headquarters. Especially is it desirable to know what subjects are of value to the greatest number and what method of presentation challenges attention. For instance, has diagnosis been emphasized at the expense of therapy? Is it the wish of members of the county societies to continue courses in certain subjects in their communities or do they desire more concentration at the University? Your opinions if expressed will aid the committee in formulating recommendations.

C. A. McKinley, M.D., *Chairman*
Committee on Hospitals and Medical Education

OF GENERAL INTEREST

Dr. Kenneth E. Stein, formerly of Prior Lake, has moved to Lakeville, Minnesota, where he opened offices April 1.

* * *

Dr. Richard E. Scammon, Dean of Medical Sciences, University of Minnesota, addressed the Fellows and Staff of the Mayo Foundation at Rochester, Minnesota, April 25, on "Observations on the Social Aspects of Medicine in England."

* * *

Dr. E. W. Johnson, graduate of the University of Minnesota, 1934, who has completed his internship at St. Mary's Hospital, Duluth, has opened offices at 4103 Chicago Avenue, Minneapolis, for the practice of general medicine.

* * *

The St. Louis County Medical Society held a most noteworthy meeting April 11 in Duluth. The Iron Range contingent in St. Louis County organized about five years ago as a separate geographic unit within the parent County Society. This was to make possible local meetings of particular import to those men engaged in a like mining practice. It is interesting, however, that few units anywhere have held as many "extension courses and lecture series" as have these men. This has been in no way a defection from the St. Louis County. Once yearly the whole society meets in the golfing season at Eshquagama; again in December, the Duluth contingent holds a Pathological Conference *in extenso* at Eveleth. And now has been inaugurated a meeting at which the Range contingent brought to Duluth the entire April 11 program; and it was of extraordinary quality and merit.

Charles W. More of Eveleth gave at the above meeting a few pages out of his repertoire, and they were of fascinating interest. His medical experiences run an amazing gamut: drug-store Iowa apprenticeship; bewhiskered talented but highly septic teaching Chicago surgeons; through the dawning foggy atmospheres of Listerian antisepsis, the tearful typhoid days, when flies and cooks kept the closest associations in the drilling and construction period of the Missabe Range, when diphtheria meant death and a man's horse in summer and skates in winter carried where the gas station now blooms, where smallpox induced special police to shoot down an occasional stampeding lumberjack, and the "honky tonks" made merry, and—well, he has one of the joy seekers' skulls, with several foramina not catalogued in anatomies and strongly reminiscent of misplaced lead! Too few men have kept these mementoes; or have the faculties essential to recreate these scenes.

REPORT OF THE COUNCIL ON PHYSICAL THERAPY

Physical therapy was in a chaotic condition at the time of the organization of the Council on Physical Therapy by the Board of Trustees in 1925. The chaos that existed was due to the activities of manufacturing agents who were selling apparatus directly to the physicians and to hospitals for "machine therapy." The profession was losing sight of the fact that true physical therapy consisted chiefly of intelligent hand work —namely, heat, massage and exercise—and that expensive machines and apparatus played a minor part in the realm of physical therapy so far as the majority of the profession was concerned. With the conditions confronting the newly formed Council, it can be readily understood that the first two or three years of the Council's existence were devoted to self education of its members; to formulating rules of procedure that could withstand criticism; and to months—even years—of study of certain physical phenomena used in physical therapy before it could refute or approve the therapeutic claims made by certain manufacturers. From a summary of the past work of the Council it can be stated that physical therapy is now in much better repute with the entire profession than it was at the time the Council was organized. Then justifiable skepticism was warranted by the misuse of physical therapy. Today patients are receiving more and more of that type of physical therapy that is of real value to them. There is still a great amount of work to be done and the Council will continue to guard zealously this field of physical therapy in order to prevent all irregular practices and to strive to enlarge its scope and usefulness for the benefit of the profession and the public at large. (Jour. A. M. A., December 8, 1934, p. 1776.)

VEGEMUCENE NOT ACCEPTABLE FOR N. N. R.

The Council on Pharmacy and Chemistry reports that workers at the Michael Reese Hospital have recently reported seventeen cases of proved gastric or duodenal ulcer relieved, symptomatically, following the administration of a mucilaginous plant substance (in contradistinction to gastric mucin) (*Illinois M. J.*, October, 1933). The material used in this work consists of powdered dehydrated okra, now marketed under the name of VegeMucene by BioVegetin Products Incorporated, which presented the product to the Council for consideration. The clinical studies made of the product, thus far, are so inadequate as to preclude any possibility of arriving at a fair estimate of the therapeutic value of the substance. The name is objectionable, as it implies that the substance is mucinous or mucoid in character, yet it is not a true mucin as the term is ordinarily employed; it resembles mucin in physical properties only. Notwithstanding the very limited studies thus far reported, the firm states in one of its advertising brochures that: "Extensive clinical tests have shown VegeMucene to be extremely effective in the treatment of patients suffering from peptic and duodenal ulcer." It is pointed out that these patients were maintained on a modified ulcer diet, which of itself undoubtedly would have effected a significant improvement in the majority of cases. The Council has been informed that the Board of Directors of BioVegetin Products, Inc., has taken formal action, endorsing lay promotion of VegeMucene. Thus the preparation has been thrust definitely into that vast realm of "ulcer cures" so elaborately exploited to the general public. The Council declared VegeMucene not accepted for New and Non-official Remedies, because it is an unoriginal preparation of powdered okra, marketed under a noninformative and misleading proprietary name, and promoted with exaggerated and unwarranted therapeutic claims to the profession and to the public. (*Jour. A. M. A.*, January 26, 1935, p. 316.)

MEDICAL ECONOMICS

Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association

B. J. Branton, M. D.
J. A. Moga, M. D.
W. F. Braasch, M. D., Chairman
J. C. Michael, M. D.
A. N. Collins, M. D.

Questionnaire

From time to time a series of questions and answers has appeared in these columns. They are designed to assist the average busy physician to answer queries that are bound to be put to him these days on the reasons back of the stand taken by the House of Delegates of the American Medical Association against compulsory sickness insurance.

Questions and answers below are based upon research material from many sources. Notably, we are indebted this month to the Medical Society of the State of New York, also the pamphlet by Dr. Gustav Hartz, labor economist and former labor member of the Reichstag, of Berlin.

It Won't Work

Question: Why are you opposed to compulsory sickness insurance?

Answer: Because *it won't work.*

The difference between sickness insurance in theory and sickness insurance in practice as seen after fifty years of experimentation in Germany, is the difference between what we would call in school a "stated problem," and an "encountered problem."

For instance, any physicist can draw a plan for a perpetual motion machine that will run forever, on paper. But when the plan is transformed into a working model, the machine stops. Why?

Because the picture on paper did not and could not adequately allow for friction and resultant loss of energy. But the friction was there, and it began to show itself as soon as the machine became an encountered instead of a stated problem.

It is possible to plan an ideal program for medical care for everybody, on paper, with the state or community paying the bill.

Anybody who complains about it puts himself in the position of appearing to be opposed to the best interests of society and the ideals of high-minded philanthropists.

Many of these plans have been made by people who had nothing else to do in life but visualize ideal conditions for the human race. Some of them appear to be professional millennium promoters.

But the doctor knows a good many things that the idealist who never treated a patient does not know.

They're Paper Plans

What the doctor knows is really the most vital part of the problem, and the one that appears nowhere in the paper plans—the imperfections of human nature itself, which will surely operate to jam the machinery.

Question: How do you know that compulsory sickness insurance will not work? Granted that doctors know a good deal about human nature, they haven't put it to a test here in sickness insurance. Perhaps people are enlightened enough to make good use of such facilities.

Answer: People in America are not greatly different from people anywhere. In Germany today, medical policemen are required to determine whether people who are claiming sick insurance benefits are really ill, or whether they are taking a summer holiday at the expense of the insurance system.

Half Were Well

Here are the results in examinations of 2,008 presumably sick patients who were examined recently by the medical policemen.

When the 2,008 were called for examinations before these newly constituted officials, they at once declared their complete recovery. Besides these, 289 were found to be well by these confidential doctors. Thus nearly half of the 2,008 who had been claiming sickness benefits were not really ill at all.

In Germany, though health in general has considerably improved, the days lost from ill health have risen from an average of five and one-half days to twenty-eight days.

Keeping Down Patients

On the other side of the picture, there is always the possibility that the doctor who is hired, not to diagnose illness, but primarily to keep down the number of patients, will dismiss many sick people as cured. Cases are not unknown where the confidential doctor has declared a patient recovered who nevertheless died a day or two later.

Question: Isn't it up to the doctors to make it a success? If the doctors are conscientious and well educated and careful, won't that take care of the friction caused by the rest?

Answer: Doctors who work in the treadmill created by general sickness insurance have no time for post-graduate study to keep abreast of new discoveries and ideas.

Automaton Doctors

They become grinds, and, after a few years, degenerate into automatons, incapable of acute diagnosis and well-judged treatment. They cannot spare the time for skilled attention, and it is but natural that, in the end, they should lose any desire or faculty for it.

The enervating effect of this type of practice is demonstrated by the paucity of worthwhile research which has come from physicians working under compulsory insurance employment in Europe.

But even if the physicians could maintain a super-human acuteness and efficiency, the physician is only one participant in medical care.

It has been stated that 40 per cent of the people of the United States get no medical care whatever, but we are not told what proportion of this number would reject it if offered.

In America the poor are free to apply to the dispensaries, where they receive better care than the beneficiaries of compulsory sickness insurance in Europe. Quality can be maintained in these dispensaries because professional men of the highest standing, as well as the younger men, give their time to those in need.

The requirements of the American system are not for quantity primarily but for quality.

The American system is not perfect, assuredly, but it works. Better an imperfect plan that works than a perfect plan that fails!

In Explanation of the California Situation

Information just received from officials of the California State Medical Association would indicate that they are confronted with an extremely difficult situation. For many years there has been a persistent, organized effort on the part of social workers, politicians, visionary uplifters and others of that ilk so widely prevalent in that sovereign state, to establish some form of compulsory health insurance. In recent years this movement has gained momentum, particularly as a result of economic conditions and the active aid and encouragement from a similar element having headquarters not far removed from Washington.

Although honest efforts were made by the conservative members of the California medical profession to stem the tide, they felt that further resistance was futile and that some form of compromise was necessary. In their emergency they thought that it was better to salvage what they could and retain some form of control. It occurs to the minds of many of us, however, that it might have been better to have gone down with the ship, maintaining the principles we know are correct, rather than compromise with those we know are wrong. It will be a severe test of the efficiency of the California State Medical Association if it can preserve order in the threatened chaos. It is possible that other states that are blessed with a more conservative public opinion, and particularly those that have a strong medical organization which has been able to influence legislative and public opinion, will be in a position to benefit by the experience of our colleagues in California. It is apparent that our western brethren have compromised with their eyes wide open. We hope they will be able to maintain control of the rudder of their storm-tossed ship, but we have our misgivings. We also hope that the good sense of the citizens of California will prevail and that they will soon realize the error of their way.

May Day Campaign

The national program for the 1935 Child Health Day, annually set by the American Child Health Association for the first day of May, was neither vague nor visionary.

Immunization against diphtheria was the very definite and concrete objective. And it is to be hoped that the welfare and public health education groups that chose this objective for the 1935 May Day will not confine their propaganda to May.

Here is a program about which there can be no difference of opinion and no dissent.

Diphtheria can be controlled if every young child is immunized against the disease.

Every child should, therefore, be immunized, preferably by his family doctor and in the doctor's office. It should be done in the first year of life and certainly before the child mingles much with other children, since the highest death rate occurs in the first five years of life.

The Council of the Minnesota State Medical Association has left it to each individual county medical society to determine just what methods shall be used in each community for immunization of the children whom the individual doctor cannot reach through his private practice.

The Council is emphatic in its approval of the objective of all these campaigns to protect the young children from diphtheria.

Incidentally, a demonstration of the latest technic in diphtheria immunization, in smallpox vaccination and the administration of the Mantoux test will be sponsored by the Committee on Public Health Education of the association at the eighty-second annual meeting at the Minneapolis Auditorium June 24, 25 and 26. This is part of the association's program of practical assistance to the May Day campaign.

More Government Hospitals

Within the last few days a flock of bills asking for increased hospital facilities for veterans has suddenly appeared in Congress.

These bills have been introduced by congressmen in some twenty-four different states. More than half the requests are for increased facilities for general medical and surgical cases. We have been informed, furthermore, that they were introduced at the request of the American Legion.

All this in spite of the fact that representatives of the American Medical Association were given the impression by prominent legionnaires in Chicago last year that the Legion program for this Congress called for no increase in hospitalization except for replacements or for necessary extra beds for neuro-psychiatric or tuberculosis cases or in communities where no hospital facilities are available.

Of especial interest to Minnesota physicians is the fact that one of these bills has been introduced by Congressman Theodore Christianson asking for a 200 bed addition for general medical and surgical cases at the Veterans' Hospital at Fort Snelling. This bill was introduced "by request." It asks for an expenditure of $360,000 for the construction. "Such construction," according to the bill, "is to provide additional hospital, domiciliary and out-patient dispensary facilities for persons entitled to hospitalization or domiciliary care under *public laws and regulations.*"

For Federal Employees?

Clearly this addition could be used, under the provisions of this bill, to provide hospitalization for federal employees of any class.

There is no reason why it could not be available for all employees on Public Works projects who come under the federal compensation law.

In fact, it looks rather as if these hospitals were being requested to anticipate the increased load that may follow upon the new Public Works program or other federal relief programs employing persons who can be construed to be beneficiaries under the federal compensation law.

Employees on federal relief projects of any kind could undoubtedly be brought under this classification.

Certainly the medical profession should be much interested to know just what is contemplated. Both the Hennepin and Ramsey County Medical Societies have asked for information on the subject. Their course in the matter will be determined by what they find out.

It if should be a fact that hospitalization for all federal employees under the compensation bureau is contemplated then the medical profession should protest as promptly and as vigorously as possible.

Individual Physician Must Help

In 1934 the House of Delegates of the American Medical Association authorized the Board of Trustees to proceed with a program of direct approach to the lay-public in discussion of sickness insurance.

The object was to find out just what people in general thought about sickness insurance.

Did they want it?

Were they dissatisfied with things as they are?

If so, just what changes did the common man think are necessary?

It seemed important to get an unbiased answer to these questions. Otherwise there was only the testimony of professional social workers and statistical studies of illness, amounts spent for medical care and costs of medical services.

The effort to get the reaction of the lay-public was put into the hands of the Committee on Legislative Activities, which, in turn, now makes an appeal to the individual physician.

A great deal has been done to get in touch with large lay groups in the interests of this program. Now it is time, in the opinion of Dr. R. L. Sensenich, South Bend, Indiana, in charge for the committee, for the physician to talk the matter over with his individual patients.

Important to Patients

Says Dr. Sensenich:

"The interest and activity of the individual physician must be aroused to the degree that he will inform himself concerning sickness insurance, and present such information to the lay-public which he contacts. In this way he will aid greatly in crystallizing public opinion against harmful legislation.

"Reports to the Committee indicate that the individual citizen of influence, who has been misled by public statements that needed medical care is not available to those financially less fortunate, has, from radio talks, magazine articles, and other propaganda, come to believe that sickness insurance is desirable. Such a man can best be contacted through his personal friend, his physician. The best interests of the patient and the best interests of the physician are common, and it is not inconsistent with the ethical teaching of medicine for the physician to advise with him concerning sickness insurance. No special technic is needed in making individual lay-contacts. The physician is generally not without some ingenuity in matters of local interest. If he is opposed to some local project he does not hesitate to approach others in order to impress upon them the undesirable character of the proposal or to enlist their assistance in defeating it. Certainly there could be nothing of more vital importance than the threatened measures. Effort must now be put forth to arouse the individual physician to interest in his own position and to his responsibility to others."

"Medical Reporter"

Number 1, Volume 1, of *The Medical Reporter* appeared April 1 in the state of Oregon.

This little publication is issued, according to its title page, by the Committee of Publicity, Oregon State and Multnomah County Medical Societies. Presumably it will be issued monthly and its policy as announced on the cover is as follows:

"We have certain facts to present, facts that we consider important to all of the Medical Profession in Oregon.

* * *

"We shall devote our attention solely to legislative, social and political problems confronting the profession.

* * *

"We would not knowingly mis-say or misrepresent any matter nor misquote any individual. We are not concerned with opinions and shall refrain from expressing any of the same. Subject to limitations of space and our editorial judgment of the general character of the material presented, these columns are open to any doctor of the state who has a fact or facts to offer."

It is interesting to note that medical journals all over the country are now setting aside a section of each issue to be devoted to Medical Economics.

That they have been made available shows the growing interest of medical men, everywhere, in the social and economic problems of medicine.

Chicago Storm Center

United Medical Service, Inc., long a storm center between factions of Chicago physicians and bitterly opposed by the Chicago Medical Society, has broken into the news again.

Dr. Joseph G. Berkowitz, president of the Service and one of the organizers, has been ousted by the board of directors and Dr. Charles R. Wiley, former vice president and also one of the organizers, has been put in his place.

The trouble was that one group believed the clinic should make a profit. The other didn't. Dr. Wiley heads the latter group, according to a story that appeared recently in the *Chicago Tribune*.

The entire clinic will be reorganized now, it appears, and will henceforth be operated as a not-for-profit institution, providing that Dr. Berkowitz is unable to carry out a threat to block the whole scheme. Dr. Berkowitz is said to own the majority of the stock in National Medicine, a Delaware holding corporation which, in turn, owns the United Medical Service. He threatens to call a stockholders meeting early in May.

One reason given by members of the staff of the clinic for opposition to Dr. Berkowitz was that he paid himself a salary of $1,000 a month and also paid high salaries to his wife and Brig. Gen. James J. Ryan (retired), vice president and treasurer, who was also ousted. Other staff members worked long hours at salaries from $150 to $200 a month.

The history of United Medical Service, originally a philanthropic venture with backing of some of the great fortunes of Chicago, provides an illuminating commentary on one type of experiment with mass medical service by a corporation.

Obviously United Medical Service degenerated rapidly into a mere business for profit with an overworked, underpaid staff and it is easy to read between the lines that quality of the low priced medical service dispensed may have suffered.

Sickness Insurance—Mr. Witte

Mr. Edwin E. Witte, Washington, D. C., executive secretary of the President's Committee on Economic Security, recently addressed a Round Table Conference of the Minneapolis Chamber of Commerce in Minneapolis.

Mr. Witte made a formal address in which he talked only about old age pensions, unemployment insurance and appropriations for maternity and infant care and for crippled children, the latter being a revival of earlier "Sheppard-Towner legislation," so-called, and an item of the program which he advocates strongly.

Not a word did Mr. Witte say about sickness insurance until a casual question was put to him after he sat down.

Then, instead of answering the question, he launched into a critical tirade against the American Medical Association for its reactionary attitude on this matter.

The President had been deluged with letters from physicians, Mr. Witte said, as soon as the program for a study of sickness insurance had been outlined.

The President was not planning to introduce sickness insurance, he said. He was simply planning to make a study. And he, Mr. Witte, was, personally, at a loss to understand why the American Medical Association should thus have opposed a mere study of sickness insurance.

He denied that the Secretary of Labor had ever made any statement to the effect that sickness insurance would actually be incorporated into this year's legislative program.

A. M. A. First

When Mr. Witte was through his attention was called by one of the doctors present who has had considerable contact with the American Medical Association, to the fact that:

The American Medical Association itself had been the first group in the country to make a study of compulsory insurance;

The American Medical Association had always been keenly interested in anything that would improve medical care;

The Association is opposed to compulsory sickness insurance, not because physicians are reactionary, but because all controlled studies and all practical experience in Europe, the only place where the practical effects of sickness insurance can be studied, have convinced them that no form of such insurance will be practicable or applicable in this country;

The American people of all classes are getting better medical care than any other people in the world today;

Health is Better

The health of the people is better than ever before, as morbidity figures will show, and, therefore, the American Medical Association can see no reason for rushing into untried schemes that may result in deterioration of standards of medical care;

From the standpoint of social security, alone, more depends upon the quality than upon the quantity of medical care.

Mr. Witte denied any connection with the Epstein bill (sickness insurance bill introduced into several state legislatures this year by the American Association for Social Security) though he admitted that he is a member of the association of which Abraham Epstein, by whose name the bill is generally known, is executive secretary.

Interested for Twenty Years

He said that he, himself, had been a proponent of social insurance for 20 years. He also said that California would surely pass laws providing for compulsory sickness insurance this year—and perhaps, on the other hand, they wouldn't.

It was evident, at any rate, from all his various statements that Mr. Witte is really heart and soul with the group that is so anxious to start some system of sickness insurance in America.

Economics for Minnesota Physicians

A lecture course on Medical Economics and Business Management will be an important feature of the Eighty-second Annual Meeting of the Minnesota State Medical Association to be held at the Minneapolis Auditorium, June 24, 25 and 26.

This course will be given by Mr. Theodore Wiprud, executive secretary of the Milwaukee County Medical Society, with Dr. R. G. Leland, Chicago, director of the Bureau of Medical Economics of the American Medical Association, to discuss each lecture. The hours will be 9 a. m. to 11 a. m., each day of the meeting, and a special Auditorium lecture hall apart from the main assembly will be arranged.

The same course has been given with great success at Marquette University and a similar course is under contemplation as a requirement for senior medical students at the University of Minnesota. Any physician, any clinic or office manager for physicians will find the course of interest and value. It is especially designed for the information and guidance of young physicians.

Medical Economics at Harvard

An interesting and significant short article on Medical Economics appeared in a recent *Harvard Alumni Medical Bulletin.*

It was written by Douglass V. Brown, Ph.D., Assistant Professor of Medical Economics, Harvard Medical School.

A footnote reveals the fact that Dr. Brown is the only man in the school working on this subject, since there is no department of Medical Economics. His professorship was created in September, 1933, and he gives his entire time to study of all problems associated with Medical Economics.

These problems, in his opinion, include all of the economic aspects of the provision of Medical Service.

"Medical practitioners have rightly been preoccupied," he remarks in this article, "with the more technical aspects of medicine. As a result, the economic phases of medical services have been largely nobody's business."

Many Problems

Among the economic phases that must be solved are those centering about the payment for medical service by various forms of insurance. Also the problems centering about the hospitals and the payment for hospitalization of the indigent.

The financing of public health activities has been given inadequate attention, too, and there is "that creature, god or devil, called 'State Medicine,' which has not even been satisfactorily defined, let alone analyzed from an economic point of view."

The following illuminating comments on these and other problems that are keeping Dr. Brown occupied are worth quoting here for those who do not often see the *Bulletin.*

Health and Wealth

"What is the mutual relation and reaction between general economic conditions and the conditions for the provision of medical service? We have had dinned into us that 'a nation's health is a nation's wealth,' *but we are more likely to overlook the equally important fact that the amount of the nation's wealth and the conditions under which it is produced and distributed will go far toward determining the nation's health.* 'Adequate' medical care is relative not only to professional standards but also to economic alternatives. 'Adequate medical care' is ambiguous almost to the point of being meaningless once the economic implications are brought into the picture.

* * *

"Another particularly knotty group of problems for the economist arises out of the unstandardized character of medical services. A bushel of wheat of a certain grade is a definite thing; even services of many kinds can be graded in terms of their results; but it may well be that the quality of medical service can never be known definitely, even to those who are engaged in providing it."

Minnesota State Board of Medical Examiners

St. Paul Chiropodist Pleads Guilty to Practicing Medicine Without a License

State of Minnesota *vs.* Peter Stolurow

On April 15, 1935, Peter Stolurow, forty years of age, entered a plea of guilty to an information charging him with the crime of practicing medicine without a license. Stolurow was sentenced by the Honorable Richard D. O'Brien, Judge of the District Court, to a term of one year in the St. Paul Workhouse. This sentence was suspended upon the following conditions: (1) That the defendant surrender to the Basic Science Board, for cancellation, his basic science certificate No. 129; (2) that he surrender to the Board of Chiropody Examiners, for cancellation, his chiropody license No. 82; (3) that defendant is to refrain from practicing healing in any way, shape or manner.

In April, 1928, Stolurow, who at that time had a license to practice chiropractic in the State of Minnesota, entered a plea of guilty to the crime of abortion, and was sentenced to a term of not to exceed four years in the State Prison at Stillwater. While the defendant was in prison his chiropractic license was revoked, but he retained possession of his basic science certificate and chiropody license. Upon his release from prison Stolurow opened an office in the City of St. Paul to practice chiropody. In March of this year information came to the St. Paul Police Department that Stolurow was greatly exceeding his chiropody license. On April 8, 1935, a complaint was filed charging him with practicing medicine without a license. On being arraigned in the Municipal Court he waived his preliminary hearing and his bail was set at $1,000.

The Minnesota State Board of Medical Examiners protested to the Court that the defendant was using his basic science certificate and chiropody license as a shield to engage in the unlawful practice of healing. Judge O'Brien told the defendant that the only conditions upon which he would suspend the sentence were those enumerated above. Before sentence was imposed Stolurow produced his basic science certificate and chiropody license in court and they were turned over to the Basic Science Board and Chiropody Board, respectively, for cancellation. The defendant will have no excuse whatsoever for again entering the field of healing in any of its branches.

Medical Board Stops Unlicensed Technician at Windom, Minnesota

The Minnesota State Board of Medical Exiaminers conducted an investigation of the so-called Free Health Clinic that was advertised for Windom, Minnesota, on April 18, 19 and 20, 1935, and discovered that one of the individuals conducting the clinic was not licensed to practice healing in any state, but referred to himself as a "technician," claiming to be in the employ of Dr. Niblack's Clinic at Lincoln, Nebraska.

Dr. Wm. B. Covey, who stated he was of Luverne, Minnesota, in the advertisement, lives in the City of St. Paul. He is licensed as a chiropractor in the State of Minnesota, and planned on holding clinics at Luverne, Windom, Worthington, Jackson, St. James and Blue Earth, Minnesota, assisted by Dr. Neal L. Niblack of Lincoln, Nebraska. According to the hotel records at Luverne, Dr. Niblack was at Luverne for one day. Dr. Niblack is not licensed to practice in the State of Minnesota, and will not be permitted to do so. The technician gave his name as T. O. Medlin. He was operating an instrument which they referred to as a Hemodia-magnometer. They advertised that it was unnecessary for the patient "to remove any clothing or be asked one single question before the examination. After the examination is complete, you will be told just what and where your ailments are. One examination free to each family. Additional examinations will be charged for at the rate of $5.00 each."

Dr. Niblack apparently returned to Lincoln, Nebraska, after spending one day at Luverne. Mr. Medlin was advised that he had no lawful right to practice healing in the State of Minnesota, and that if he continued to do so a complaint would be made to the proper authorities. Mr. Medlin immediately disconnected the machine and placed it in his automobile. He stated that he was leaving the following morning for Lincoln, Nebraska. In view of that fact that Dr. Covey holds a basic science certificate and a chiropractic license, he has a lawful right to practice chiropractic anywhere in the State of Minnesota.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for May

The Minnesota State Medical Association Morning Health Service.

The Minnesota State Medical Association broadcasts weekly at 10:30 o'clock every Tuesday morning over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month will be as follows:

May 7—Hay Fever.
May 14—Anemia in Children.
May 21—Peptic Ulcer.
May 28—The Sixth Year Molar.

American Association for the Study of Goiter

The annual meeting of the American Society for the Study of Goiter will be held in Salt Lake City, Utah, June 24, 25 and 26, 1935.

Addresses by outstanding members of the medical profession from the East and West are announced in the preliminary program just received. In addition to addresses, dry clinics are scheduled.

Dr. Allan Graham of Cleveland is president of the Association and Dr. W. Blair Mosser of Kane, Pennsylvania, is corresponding secretary.

American Urological Association

The officers of the American Urological Association and its Western Branch Society cordially invite all physicians of the Western Hemisphere interested in Urology to participate in the thirty-second national convention in San Fransciso, June 24-28, 1935.

A splendid program has been arranged for the members and their families and headquarters will be in the world-famed Palace Hotel. Scientific sessions will be conducted June 25, 26 and 27 and the Western Branch Society will convene June 28. On Wednesday, June 26, Prof. Hugh Hampton Young of Johns Hopkins University, will deliver the Ramón Guiteras Lecture on "The Abnormalities and Plastic Surgery of the Lower Genito-urinary Tract." Monday, June 24 has been set aside for the annual golf tournament which will take place on picturesque evergreen links overlooking the Pacific Ocean, followed by a stag dinner. A banquet will be held on the evening of June 26 and a dinner dance on June 27. Both functions will be graced by the presence of the fairer sex and their families.

Take advantage of the greatly reduced railroad rates and visit San Francisco whose historic background, Bohemian atmosphere, cosmopolitan aspect and cool summer climate make it an ideal and interesting place to spend a summer vacation.

Dr. Charles P. Mathé, 450 Sutter Street, San Francisco, is chairman of the Publicity Committee.

State Meeting

One of the highlights of the eighty-second annual meeting of the Minnesota State Medical Association to be held in the Minneapolis Auditorium, June 24, 25 and 26, will be a talk by Dr. Adolph Hanson of Faribault. Dr. Hanson, because of recent contributions in the field of endocrinology, has the distinction of being the one exception to the policy of out-of-state speakers for this year's meeting.

He will show a film prepared by Dr. L. G. Rowntree and his associates of the Philadelphia Institute for Medical Research of the University of Pennsylvania, on the experimental use of rats of the extracts of the thymus and pineal glands, isolated by Dr. Hanson.

An exhibit of animals treated with the thymus extract will be outstanding among the many scientific demonstrations and exhibits planned for this year's meeting. The exhibit will be brought here by Arthur Steinberg of the Philadelphia Institute and besides other animals will include a pregnant white rat far enough advanced in gestation to yield a litter of precocious rats either during the meeting period or shortly before.

Experiments with Dr. Hanson's extracts by Dr. Rowntree and his associates received nation-wide newspaper comment in April, when full verification of the existence of the extract and its amazing effects on five generations of rats was reported by Dr. Rowntree. An exhibit, similar to the one which will be brought to Minnesota, attracted wide attention when shown at the Interstate Postgraduate Medical Association Meeting in Philadelphia last fall.

Two hours of program time each day will be devoted to these demonstrations, which, with the scientific exhibits, will number about fifty.

A feature of the meeting will be two joint sessions to be held with the American Association for the Advancement of Science, which will be meeting at the University during the same week.

Fifteen men, outstanding in various phases of medical work in the United States, are scheduled to appear on the program as principal speakers. Among these is Dr. Max Cutler, one of the foremost authorities on cancer in the country.

Dr. Cutler will be brought to Minneapolis by the Citizens' Aid Society and will give the annual Citizens' Aid Society Memorial lecture on cancer. His subject will be "Recent Advances in the Treatment of Cancer." He will speak on the Monday morning program.

Dr. Cutler is Consultant in Tumors at the Edward Hines, Jr., Veterans' Hospital, and director of the Tumor Clinic at the Michael Reese Hospital, Chicago.

He is president of the American Society for the Study of Neoplastic Disease.

Also, on the Monday morning program will be a clinic to be conducted by University of Minnesota doctors. It is in connection with this clinic that Dr. Hanson will present his film and speak. A second clinic will be conducted Wednesday morning by doctors of the Mayo Clinic, Rochester. A medical court in which specialists in many fields will answer questions will be a part of Wednesday afternoon's program.

Another feature will be a course in medical economics and business management to be conducted by Theodore Wiprud, executive secretary of the Milwaukee County Medical Society. This is the same course which is offered at Marquette University. Dr. R. G. Leland, Chicago, Director of the Bureau of Medical Economics, American Medical Association, will discuss the lectures.

Dr. Leland will also talk Tuesday night at the meeting which will follow the annual dinner. Entertainment for the occasion is being arranged by the Hennepin County Medical Society. Featuring the entertainment program for the entire meeting will be a hobby show where medical men may see the diversions which occupy their fellow physicians' spare moments. Already a number of entries have been received, including musical scores, firearms, pipes, old books and others, which will be exhibited in a special room where treasures may be guarded.

Minnesota Radiological Society

The winter meeting of the Minnesota Radiological Society was held in St. Paul, Minn., on March 16, 1935. The following program was presented:

1. Radiography of Sphenoid Sinuses Through the Open Mouth..............Edward Schons, M.D. St. Paul
2. Roentgenological Study of the Mastoid with Operative Findings in 230 Cases............ H. M. Berg, M.D. Bismarck, N. D.
3. Biliary Dyskinesia............Herman Wolff, M.D. St. Paul
4. Comparative Value of Radium and Roentgen Therapy in Various Types of Malignancy... Charles Drake, M.D. Minneapolis
5. Roentgen Diagnostic Round Table
6. Disadvantages of X-ray Paper from the Physical Standpoint..........Alfred B. Greene, B.Sc. Oak Terrace, Minn.
7. Medical Economics in Relation to Radiology... Informal Discussion

The annual meeting of the Society will be held in Minneapolis in connection with the meeting of the Minnesota State Medical Association, June 24, 1935. At that time the Carman Lecture in Radiology will be given at the meeting of the Minnesota State Medical Association by Dr. Percy Brown of Boston. Dr. Brown's subject will be, "Value of Fluoroscopy in Roentgen Diagnosis and Carman's Influence Upon It."

Sincerely yours,

Leo G. Rigler, M.D.

Minnesota Society of Internal Medicine

The spring meeting of the Minnesota Society of Internal Medicine will be held at the University, Saturday, May 18. Morning and afternoon sessions will be devoted to the presentation of scientific papers. Luncheon will be held at the Town and Country Club, Saint Paul, and dinner at the Club will be followed by the business meeting and an address by Dr. Percy Watson. Dr. Edwin L. Gardner is president of the Society, and the program has been arranged by Dr. Henry Ulrich.

Minneapolis Surgical Society

The program of the Minneapolis Surgical Society to be held in the lounge of the Hennepin County Medical Society, Thursday, May 2, 1935, at 8:00 p. m., is as follows:

1. Dr. Charles E. Merkert (20 minutes)
   Inaugural Thesis: Tetanus.
2. Dr. Carl O. Rice (15 minutes)
   Histo-pathological Study of the Tissues Following the Injection Treatment for Hernia.
   General Discussion of the Injection Treatment of Hernia.
3. Dr. W. A. Hanson (15 minutes)
   Dr. L. Haynes Fowler.
   Tumors Simulating Carcinoma.

A business meeting will be held at a six o'clock dinner preceding the scientific program.

F. A. Olson, M.D., *Secretary.*

Nicollet - Le Sueur

The spring meeting of the Nicollet-Le Sueur Counties Medical Society was held, April 4, at the State Bank building, Le Sueur.

In accordance with a request from the State Public Relations Committee, Doctors M. E. Lenander, J. J. Kolars and P. J. Hiniker were appointed to act as a Public Relations Committee for the society.

On invitation, Doctors J. S. Holbrook and A. E. Sohmer of Mankato discussed the Blue Earth County plan for the care of the indigent, patterned after the Iowa plan. After discussion as to the advisability of changing Le Sueur County to the County Plan of care of the indigent, a committee of one member from each town was appointed to work with the county attorney and devise some method whereby care of the indigent can be handled more satisfactorily and expeditiously. If plans materialize, the committee intends to contact all township boards and place the matter before them.

Dr. F. P. Strathern presented a case of fracture of the fibula and astragalus. Dr. Holbrook showed x-ray of abdominal tumor that proved to be a pregnancy. Dr. M. C. Petersen gave the history and showed films of a case of slow bleeding due to nails, pins, et cetera, in the stomach. Dr. Strathern also reported on 2,400 Mantoux tests in Nicollet county, with 250 positive reactions.

The secretary read a communication about the annual state meeting, June 24, 25 and 26, urging members interested in the hobby show to get in touch with Dr. F. A. Olson, of Minneapolis. The message also stated that the meeting promises to be one of the very best, being held in conjunction with the American Association for the Advancement of Science.

Northern Minnesota Medical Association

The Northern Minnesota Medical Association will meet in Duluth, August 12 and 13 this year. Drs. M. G. Gillespie, chairman of Program Committee, and F. H. Magney, chairman of local Arrangement Committees, are arranging for a fine scientific session and entertainment.

It is planned to hold the second day's session in the Lounge on one of the pleasure boats making a fifty-five mile trip up the North Shore of Lake Superior. The doctors are urged to plan early with their wives to take their vacation at this time and come to Duluth. Special entertainment is being arranged for the ladies on the same boat.

O. O. Larsen, *Secretary.*

American College of Surgeons North Central Section

The American College of Surgeons of the North Central Section, composed of Minnesota, Wisconsin, North Dakota, South Dakota and Manitoba had a two day conference March 15th and 16th and a Community Health meeting at the St. Paul Auditorium on the afternoon of March 17th. At the same time Hospital Executives of this area also met.

On Friday morning, March 15th, the conferences were broken up into three meetings. Out-of-town guests were speaking at twelve high schools and colleges on health matters while surgeons gathered at surgical and medical clinics in the local hospitals and at the same time a hospital conference was being conducted at the Lowry Hotel under the direction of Dr. Herman Fritschel, Superintendent of the Milwaukee Hospital.

Of the hospital clinics, the Cancer Clinic conducted at St. Joseph's Hospital, the Fracture Clinic at Ancker Hospital and the Neurological Clinic held at Mounds Park Hospital were of special interest to the visiting doctors.

The Hospital conference for hospital executives, trustees and others interested in hospital work was held in the Lowry Hotel, Friday, March 15th, and attracted a large number of visitors. Dr. MacEachern, Associate Director of the American College of Surgeons and Director of Hospital Activities emphasized the standards required by the American College of Surgeons and that these standards must be provided in any hospital that desires to render good service to patients and that many of the detail problems arising in addition to these standards must be solved by each individual hospital. Mr. Paul Fesler, Superintendent of the Wesley Memorial Hospital of Chicago, in speaking of the trends in hospital administration, stated that all hospitals must be aware of the economical trends now affecting hospitals and in spite of the necessary reductions of expenditures, we must not endanger the care of patients. Hospitals are now meeting a rising market; hospitals must be paid or the service provided patients will suffer. They must be subsidized by the government or through group hospitalization or through some insurance method.

A luncheon was given by the St. Paul Association at the St. Paul Hotel, where 300 business and industrial workers heard Dr. Besley speak on the subject "Preservation of Health in Industry." Dr. Robert Jolly spoke on "Hospitals, Doctors and Disease." Dr. F. Besley stated that accidents and illness "can be reduced materially by establishment of properly organized medical departments to care for the human machinery, the same as engineering departments look after the inanimate machinery in all large and small industries. The medical department should be given complete control of the health and welfare of workers in each industry. It should be responsible only to the president of the company and his board of directors and should not be dictated to by the personnel man or the foreman. This same principle should apply to insurance companies which are assuming risks under workman's compensation laws."

A business meeting was held Friday night by the American College of Surgeons and the following officers were elected. Dr. Cole was re-elected Chairman of the state executive committee of the College and Dr. James M. Hayes, Minneapolis and Dr. O. J. Hagen, Morehead, were re-elected secretary and counselor, respectively. Other executive committees names were: Wisconsin, Dr. F. Gregory McConnell, Oshkosh, chairman; Dr. Wm. J. Carson, Milwaukee, secretary; and Dr. Thomas J. O'Leary, Superior, counselor: North Dakota, Dr. Murdock MacGregor, Grand Forks, chairman; Dr. John H. Moore, Grand Forks, secretary and Dr. John E. Countryman, Grafton, counselor: South Dakota, Dr. E. A. Pittenger, Aberdeen, chairman; Dr. F. Daniels Gillis, Mitchell, secretary and Dr. Wm. G. Magee, Watertown: Manitoba, Dr. B. J. Brandson, Winnipeg, chairman; Dr. George W. Fletcher, Winnipeg, secretary and Dr. W. A. Bigelow, Brandon, counselor.

The community health meeting held Sunday afternoon was received with enthusiasm and support by the citizens of the community. The theatre auditorium was completely filled which necessitated an overflow meeting in the adjacent stage auditorium. The meeting opened with addresses of welcome by Mayor Gehan, John P. Devaney, chief justice of the State Supreme court and Dr. Robert B. J. Schoch, city health officer. Addresses included discussions of cancer, appendicitis, backache, nervousness and operation of hospitals. Speakers were Dr. Leroy Long, Oklahoma City, Dr. Irvin Abel, Louisville, Dr. M. T. MacEachern, Chicago, Dr. F. A. Besley, Waukegan, Illinois, Dr. Phillip H. Kreuscher, Chicago, Dr. Alfred W. Adson, Rochester, and Robert Jolly, Houston, Texas.

Dr. Irvin Abel, professor of clinical surgery at the University of Louisville, Kentucky, said, "Cancer can be cured but it must be treated early." He urged the delegates to join in a militant mass attack on the disease. He said, "Experience has shown two of the most important phases of the cancer problem involve the time element. In other words, early recognition and the application of appropriate treatment. It is estimated that from 70 to 90 per cent of cures are now obtained where small, localized malignant growths are accorded prompt and efficient treatment, while in but 10 to 15 per cent are such results obtained in late cases throughout the body. The three factors which in the light of our present knowledge appear vital to its accomplishment are cancer education, cancer treatment and cancer research. Every hospital can and does supply treatment. Every hospital can and should participate in the clinical aspect of cancer research. Every hospital and its staff should take part in the program of cancer education to bring forcibly to the attention of the profession and the public the facts that cancer is curable when recognized early and treated by established, time-tested methods."

Dr. Newquist of Chicago said, "It is the job of industrial medicine to prevent accidents and illness among workers and its vigilance extends to prevention of occupational diseases, such as silicosis and lead poisoning, which might result from the conditions to which a worker is exposed unless properly protected. Eight hundred agents used in manufacturing processes are toxic or are so closely related to know toxic agents that poisoning might be expected unless guarded against. Those toxic agents change from year to year as manufacturing changes and industrial physicians must be constantly on the alert to set up safeguards. Industrial medicine is becoming more of a specialty every day because of industry's demands for adequate medical service. The demand was brought about by these conditions—more rigid application and extensive coverage of workmen's compensation laws, the increasing complexity of manufacturing processes with attendant occupational disease hazards, and the presence of contagious and infectious diseases. The objectives of industrial medicine are to determine by examination the mental and physical fitness of a man for work, to maintain the health and efficiency of those already employed, to educate the worker in accident prevention and personal hygiene and to reduce absenteeism. Injuries, illness, time-loss and relating expense cost industry approximately 600 million dollars in 1934. Injuries increased 14 per cent and time loss 37 per cent over 1933. This was caused partly by hiring of new employees and by the return of old employees after a long layoff and partly by the disorganization of safety and medical services in plants during their period of idleness. Employers are recognizing that preservation of their employees' health is good business and also are realizing that if a man becomes too slow or unsuited for one job, he may fit very well into another and need not be discharged. Industrial medicine, by examining a man, can place him in the job which he can best fill."

On the cheerier side, Dr. MacEachern predicted that the present generation will have a longer span of life. "Medical education," he said, "has progressed far beyond the point of talk about fresh air and tooth brushes. That is familiar routine now, and because of it, the growing health consciousness of high school children of today will aid these children in living longer than their parents. The human life line in America has been extended from the age of 40 to the age of 59 or 60 in the past 40 years. Medical science, as yet, has learned comparatively little of the cause of cancer, which is responsible annually for 92 deaths among every 100,000 persons in America. Cancer is public health enemy No. 2. Heart disease, which kills annually 214 persons in every 100,000 is the most prevalent cause of death today. Others in the order of their gravity are kidney complications, pneumonia, diseases of the arteries and high blood pressure and tuberculosis. Cancer can be cured if early recognition is followed by surgery, x-ray or radium treatment." He cited 26,000 cured cases of cancer.

WOMAN'S AUXILIARY

President—Mrs. Martin Nordland, Minneapolis
Editor—Mrs. C. F. Ewing, Wheaton

West Central Minnesota

Members of the West Central Auxiliary met with their husbands for dinner in the evening at Morris, Minnesota, April 17. Among other business, Mrs. Otto Bergen was named chairman of Public Relations of our District. There were nine members present. We feel that if every district in the county were organized it would promote a wonderful feeling between doctors and their wives everywhere.

* * *

St. Louis County

Mrs. T. O. Young, Duluth, opened her home for a one o'clock luncheon Tuesday, April 16, to members of the Women's Auxiliary to the St. Louis County Medical Society. Assisting hostesses were Mrs. P. F. Eckman, Mrs. P. G. Boman, Mrs. K. R. Fawcett and Mrs. L. R. Gowan.

* * *

Swift-Meeker-Kandiyohi Counties

The Medical Auxiliary of Swift, Meeker, and Kandiyohi Counties met at Willmar, April 17, having dinner with their husbands and a social evening following. On April 25 there was a meeting of the Auxiliary at Benson at which members were present from Swift, Meeker, Kandiyohi Counties and West Central Minnesota.

TRANSACTIONS *of the* MINNEAPOLIS SURGICAL SOCIETY

Stated Meeting Held March 7, 1935

The President, Dr. Martin Nordland, in the Chair

DIVERTICULOSIS AND DIVERTICULITIS OF THE COLON

Inaugural Thesis

William R. Jones, M.D.

Diverticula of the bowel are outpouchings or sacculations from the bowel. They are of two types: congenital or true, and acquired or false. The congenital type contains all the coats of the bowel; Meckel's diverticulum is an example. This type usually occurs in the small intestine. The acquired type is practically always false; it is a hernial protrusion of mucosa through the muscle layer of the bowel. The pouch contains only two coats—mucosa and serosa. This type occurs most frequently in the colon. In the early stages of formation, diverticula may contain muscle as well as mucosa and serosa; however, the muscle layer soon thins out and disappears (Fig 5).

History.—Diverticula were probably first described by Creveihier,[8] in 1849. They were again described by Virchow,[30] in 1853, at which time he described the state of peridiverticulitis. In 1898, Graser[13] showed that diverticulitis was not such an uncommon condition and that it was of great importance. Wilson, Mayo and Giffin,[20] in 1907 reported five cases of diverticulitis of the sigmoid colon in which resection was done. Since this time many contributions to the literature have been made. Telling and Gruner,[29] Spriggs and Marxer,[27] Judd and Pollock,[16] Sistrunk,[26] Erdmann,[11] Rankin and Brown,[23] Mayo,[21] Lockhart-Mummery,[18] and many others have written on the subject. Probably the most comprehensive description was given by Telling and Gruner,[29] in 1916.

Distribution.—Diverticula of the colon occur along the entire course of the bowel. They have been found in the appendix and the rectum. They are found in the colon with increasing frequency from right to left. The maximum number occur in the sigmoid flexure, and it is at this site that they most frequently become inflamed, giving rise to the condition called diverticulitis. The pouches are found on the antimesenteric and lateral walls of the colon and not on the mesenteric wall.

Age Incidence.—Diverticula of the colon usually are found after the age of forty. An occasional case has been reported under this age. Erdmann[11] reports one in a child of seven, but, even so, the disease is relatively rare in children.

Etiology.—The cause of diverticula of the colon or diverticulosis is a disputed question. Several theories as to their origin include: (1) obesity; (2) constipation; (3) bowel wall weakness; (4) increased intracolic pressure; (5) blood vessel openings in the bowel wall; and (6) infection. Bowel wall weakness and increased intracolic pressure are probably the immediate causes. The sigmoid colon is the usual site of diverticulitis. It is at this point that feces become more stagnant and less fluid. Considerable amounts of gas form at this point, causing an increased amount of pressure in the sigmoid. It seems reasonable that any factor, such as constipation, which raises the pressure within the sigmoid, would contribute to the pushing out of mucosal herniæ. Judd and Pollock[16] report that 63 per cent of their patients were constipated. On the other hand, constipation is more frequent in women than in men, and diverticulitis is more frequent in males than in females. Telling[29] states that it is quite common for large amounts of gas to collect in the male sigmoid, and that this is an important factor in the formation of diverticula in this region.

It has been noted by many investigators that bowel wall weakness is important in the formation of diverticula. The condition of diverticulosis is usually found in individuals over forty years of age who are obese and who lead sedentary lives. The bowel wall in this type of individual becomes weaker after the age of forty. Diverticula occur more frequently in fat-laden gut than in that which possesses less fat. Fat infiltrates between muscle fibers, causing a weakness of the muscle layer of the bowel wall, thus inviting pouch formations when the intrasigmoid pressure is increased. Diverticula are frequently found invading the appendices epiploicæ; this is another reason for the fat theory of origin (Figs. 1, 2, and 4).

Diverticulosis is found in individuals who are not necessarily obese, though many of these have lost weight and much fat has disappeared from the bowel wall. Frequently a hernia will occur at the weakened point. This point has been found experimentally on the cadaver to be on the mesenteric border. This finding was probably the basis for the theory that vascular orifices caused weakness on the mesenteric side. When a living colon is distended, it ruptures on the antimesenteric border. This has been proved in the laboratory on a dog, and the same observation has been made on a man after an air hose had been accidentally applied at the anus. Most of the evidence in false diverticula formation points to weakened muscle in the bowel wall and increased intracolic pressure. One might compare a colon with multiple diverticula to an old weak automobile inner tube that has lost much of its tonicity.

Pathology.—Diverticulosis per se is innocuous unless infection occurs. Infection results in inflammation of one or more of these pouches. Diverticula of the colon may be single or multiple; a single diverticulum is rare. Diverticula vary in size from a microscopic pouch to the size of a plum seed. They begin as small pouches. Subsequently, the mucosa may grad-

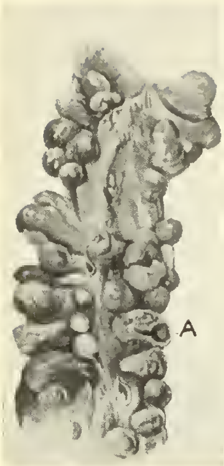


Fig. 1

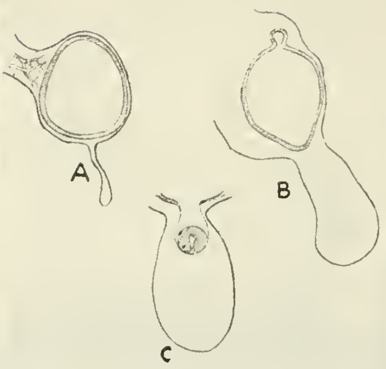


Fig. 2

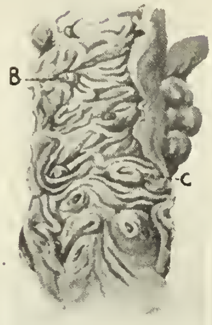


Fig. 3

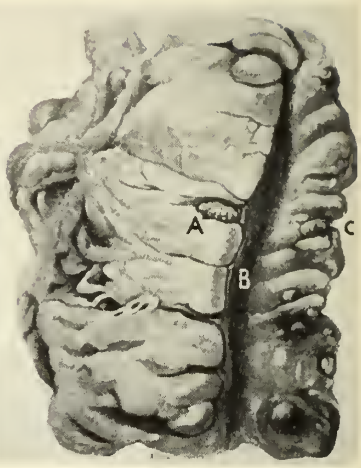


Fig. 4

Fig. 1. Diverticula of the sigmoid. The fat has been dissected from the outer aspect of the bowel. The pouches are for the most part in the appendices epiploicæ. *(A)* A sac which has been laid open. *(From Telling and Gruner.)*

Fig. 2. The manner in which richness of the appendices epiploicæ in fat predisposes to diverticulum formation. *(A)* Diagram of a transverse section of the colon from a thin individual, to show the relation of the epiploic appendix to the subserous fat. *(B)* Diagram of a transverse section of the colon from a very obese male, aged fifty-five, to show the disposition of the subserous fat, and its relationship to the epiploic appendage. A diverticulum is in the process of formation. *(C)* Diagram showing a diverticulum pouching into the epiploic appendage, and containing a fecal concretion, in the interior of which is a foreign body. *(From Telling and Gruner, after Bland-Sutton.)*

Fig. 3. Inner surface of the bowel of specimen shown in Figure 1. *(B)* Concretion presenting at orifice of one of the diverticula. *(C)* Lipped orifice of a diverticulum. *(After Telling and Gruner.)*

Fig. 4. Diverticula of the sigmoid, showing enteroliths. The abundant fat has been dissected from one half of the bowel, showing pouches which entered the appendices epiploicæ. *(A)* A single pouch which has been dissected out, showing well how they are buried in fat, and liable to pass unrecognized unless especially sought for. *(B)* Longitudinal band. *(C)* Concretion. *(After Telling and Gruner.)*

ually push its way through the muscle layer of the bowel wall, the muscle thinning in front of the evagination. Finally, a bottle-shaped pouch is formed, the bottle neck being at the mouth of the sac. The wall of a diverticulum is composed of mucosa and serosa. No inflammation is present in the state of diverticulosis. This mode of formation shows that these pouches are due to bowel wall weakness and increased intracolic pressure rather than to primary infection, as stated by Spriggs and Marxer.[27] These investigators believe that before any pouch forms there has been some infective process in the muscle layer of the gut wall, causing it to be weakened. They believe that the infective process is due to an abscessed tooth or other focal infection.

In a diverticulum in the sigmoid, fecal material which has lost much of its fluid content and has become pasty may collect in the pouch. This material may become dried and hard, possibly becoming a fecal stone. The stone may irritate the lining of a diverticulum and at times may tend to erode the sac wall. At times stones of this nature will project into the bowel lumen. When this occurs the stone is in contact with the normal moving fecal mass. The result of peristaltic action on this mass may cause sudden perforation. (Note thin-walled sacs—Figs. 3 and 5.)

Frequently trouble is caused by mechanical irritation with infection. The bottle-shaped pouch is often poorly drained, and when, from irritation, edema of the sac occurs, the diverticulum may be incompletely drained or not drained at all. This part of the bowel is rich in bacteria, making conditions ideal for infection. Inflammation of varying degrees may, therefore, occur. This inflammation may simulate appendicitis, except that it is on the left side of the abdomen. The condition may be of mild degree and may subside; or it may progress and cause a general peritonitis, or a local abscess or a fistula, or peridiverticular adhesions. Bacterial toxins or bacteria may pass through a thin-walled pouch without actual perforation and cause a general peritonitis; or these bacterial toxins and bacteria may set up a chronic proliferative inflammation in and about the bowel wall. This latter condition is known as peridiverticulitis (Figs. 6 and 7).

At times a large amount of fibrous tissue is formed, causing the bowel wall to be as much as two inches thick. This fibrous tissue may contract and become hard, even becoming cartilaginous. When contraction takes place, stenosis of the bowel may result. At the time proliferation takes place, ulceration of the sac wall may occur. This may lead to perforation and multiple abscess formation. Because of protective adhesions, rupture into the general peritoneal cavity usually does not occur. Such abscesses stimulate more fibrous tissue formation, thus causing the mass to become harder and larger. It is not surprising that this condition has been confused with carcinoma. When a mass of this kind is resected, it should be examined thoroughly, both grossly and microscopically, for carcinoma. A diverticulum may perforate suddenly as described above, because of erosion by a fecalith. However, due to the chronic nature of the inflammatory process, the weakened sac wall is usually protected by adhesions and only a local abscess forms.

An abscess usually causes pain, fever, and a leukocytosis. It may drain by spontaneous rupture into a

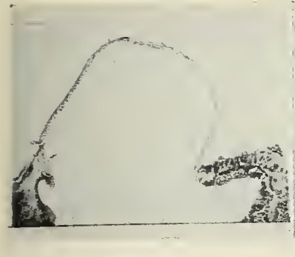


Fig. 5

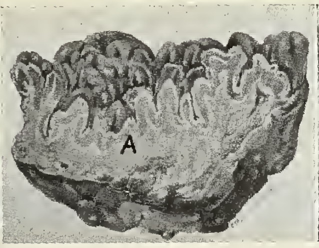


Fig. 6

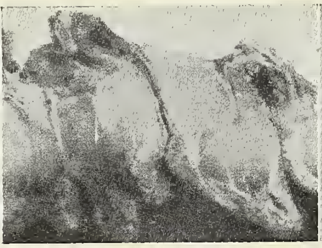


Fig. 7

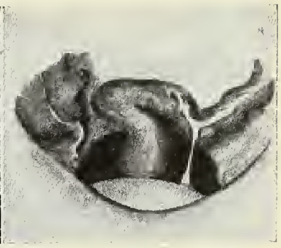


Fig. 8

Fig. 5. Microscopic section through a diverticulum, to show the muscularis terminating suddenly at the neck of the sac. The other coats are much attenuated. *(From Telling and Gruner, after Hartwell and Cecil.)*

Fig. 6. Peridiverticulitis, with great thickening of the gut wall, causing stenosis and simulating carcinoma, for which it was mistaken when resected. *(A)* Thickening, due to fibrosis. *(After Telling and Gruner.)*

Fig. 7. Great peridiverticular thickening with high grade stenosis, and elongated and tortuous diverticulum is well seen. *(From Telling and Gruner, after W. J. Mayo.)*

Fig. 8. Diagram of the brim of the pelvis, to show an adhesion between the sigmoid and the pelvic floor, dragging the bowel down and allowing the production of a kink. A portion of the cecum and appendix is seen at the left. *(From Telling and Gruner, after Pennington.)*

neighboring viscus, such as the bladder or small intestine, tube or ovary, or it may rupture externally. Occasionally a diverticulum may rupture into a hernial sac. When such a rupture occurs, a fistulous tract is formed between the bowel and whatever viscus it invades. A diverticular mass may become adherent to an adjoining organ without fistulous formation resulting. Adhesions to small intestine may cause intestinal obstruction; those to the bladder may give rise to frequent and painful micturition. Adhesions usually interfere with free movement of the sigmoid and may cause angulation or kinking of this part of the colon (Fig. 8). Volvulus may result from this kinking. Metastatic abscesses to the liver may result.

Diverticulitis has been said to be a predisposing cause of carcinoma, the chronic nature of diverticulitis, with irritation over a long period of time, being blamed. Judd and Pollock[16] report a series of 137 cases of diverticulitis with operation. In 118 of these cases there was no evidence of malignancy. Carcinoma was found in nineteen cases associated with diverticulitis. They state that in many cases there seemed to be no relation between the two conditions, and that in some of these cases there were only two or three diverticula present, and that these were remote from the carcinoma. Their conclusion is that a patient with diverticulitis is no more apt to develop malignancy than a patient without it.

Symptoms.—The presence of diverticula or diverticulosis does not give rise to any symptoms. It is only when one or more pouches become inflamed or perforation occurs that symptoms appear. In the mild type of diverticulitis the patient usually complains of some discomfort about the umbilicus or in the left lower abdomen. There is some flatulence, and nausea may be present. There is usually tenderness to palpation over the affected area, with slight muscle rigidity. Constipation is usually present although it may alternate with diarrhea.

In the more severe cases of inflammation the symptoms are aggravated. They increase in severity in proportion to the degree of pathological changes present. Varying degrees of obstruction are present where the bowel lumen in encroached upon. Complete obstruction may develop. If perforation occurs without walling off, the symptoms of general peritonitis are present. If an abscess ruptures into an adjoining pelvic viscus, symptoms referable to that organ make themselves evident. If a loop of small intestine becomes adherent to the diverticular mass, intestinal obstruction may develop. If an entero-colic fistula develops, the contents of the small intestine are passed from the rectum. When the mass adheres to the bladder, frequent and painful micturition may follow. If a fistula occurs between the mass and the bladder, gas, feces, pus and blood are passed from the urethra. Frequency and burning on urination usually occur also. Blood may be present in the stool, although this is not common unless there is an associated carcinoma.

Diagnosis.—When a patient presents himself for study giving a history of lower abdominal pain or discomfort, especially on the left side, with flatulence and irregularity of the bowels, diverticulitis should be kept in mind. As diverticulosis causes no symptoms, it can only be diagnosed by x-ray examination of the colon, either by barium enema or a barium meal. In many cases the diverticula can be seen filled with barium when the enema is retained (Fig. 9). In others, the column of barium obscures the pockets, especially if there are only a few present. In such a case, diverticula may be demonstrated after the bowel is emptied (Fig. 10), the sacs retaining some of the shadow-casting media. Many cases of diverticulosis are found in a routine examination of the bowel. Rankin and Brown[13] report that 5 per cent of all cases subjected to colon x-ray study in a five year period at The Mayo Clinic showed diverticula, and that diverticula were found in 5 per cent of autospies performed during this period. D. F. Jones[15] states that 12 to 15 per cent of cases of diverticulosis will develop diverticulitis. X-ray study of a case of diverticulitis will usually show the barium-filled pockets and also a spastic area at the inflammatory site (Fig. 11). This area gives the appearance of spikes or a fir cone appearance described by Spriggs and Marxer[4] and by Sir Gordon Watson[12] (Figs. 11 and 12). X-ray examination is probably the most reliable single means of diagnosis.

Sigmoidoscopic examination may be of value. At times the openings into the sigmoid can be seen. Usually, however, these openings are too high and cannot

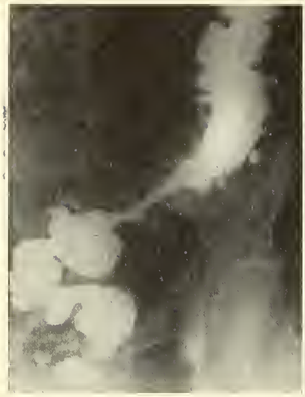


Fig. 9

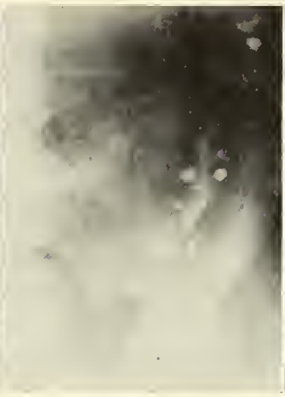


Fig. 10

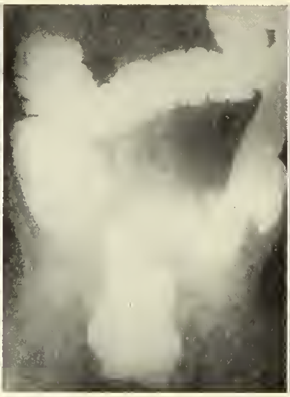


Fig. 11

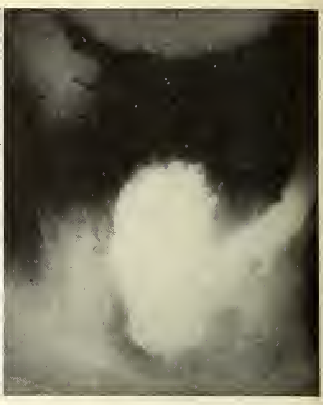


Fig. 12

Fig. 9. X-ray showing multiple diverticula filled with barium, and narrowing of the colon.
Fig. 10. X-ray after evacuation of barium enema, showing retention of the opaque media in diverticula.
Fig. 11. X-ray of colon, showing diverticula and spiked appearance, due to inflammation.
Fig. 12. X-ray of colon, showing inflammatory area in sigmoid.

be reached by the sigmoidoscope. This investigation should be done carefully and gently as it is dangerous in the presence of acute inflammation.

When a vesico-colic fistula is present, cystoscopic examination may be of value. Usually the actual mouth of the fistula cannot be seen but an inflammatory area can be found on the bladder wall. When this fistula is present, methylene blue injected in the rectum will appear in the urine. In many cases a mass in the lower left quadrant of the abdomen can be palpated. Not uncommonly a history of intermittency is obtained, the patient at times being free, or relatively free, from symptoms, and at intervals suffering severely. There is usually not much weight loss. This is not the history of carcinoma, which is progressive and continuous, and which usually results in more weight loss.

Frequently x-ray can differentiate between these conditions. At times they can only be differentiated by microscopic examination of the resected tumor. Blood in the stools occurs more frequently in carcinoma than in diverticulitis. This is true because in carcinoma ulceration of the mucosa of the bowel usually occurs and in diverticulitis seldom does. When gas and feces are passed from the urethra, the diagnosis of a vesicocolic fistula is certain. When the contents of the small intestine come from the rectum, an entero-colic fistula is present.

Prognosis: Hunt[14] states that the finding of symptomless diverticula of the colon by x-ray examination is of no more significance than the similar visualization of a symptomless appendix or gallbladder. This is not entirely correct because a colon in which diverticula are present is a colon with a weakened wall. Furthermore, diverticula are usually multiple, while the appendix or gallbladder is a single structure. If inflammation develops in a diverticulum, the condition is more serious than appendicitis. The appendix can be removed with little risk, while operation for diverticulitis is of a major type and involves greater risk, according to Daniel Jones[15] carrying a mortality of 12 to 22 per cent. If the patient follows the instructions of a competent physician, the prognosis should be good. The cases of fistula and abscess are serious and require careful surgical management. Perforation with general peritonitis is serious and carries a high mortality.

Treatment.—A case of diverticulosis should be under the management of a physician. Attention should be given to general body health. Any focus of infection which tends to lower the patient's resistance should be removed. Moderate exercise, regular habits and rest should be encouraged, and overweight discouraged. A simple smooth diet such as prescribed by Bargen and Victor[2] should be followed. Constipation is to be avoided. As this condition has a tendency to progress, the colon should be x-rayed once a year.

A patient with low grade diverticulitis should be put to bed. To rest the bowel, morphine and atropine should be given. Hot packs applied to the abdomen seem to give some relief. Hot rectal irrigations at low pressure with normal saline are of value. A liquid or soft diet is the only food that should be allowed. Usually with this type of treatment a mildly acute attack will subside. After the acute symptoms have disappeared, the patient may be treated as a case of diverticulosis; in addition, mineral oil should be given orally in one to two dram doses two or three times a day as necessary in order that a soft, but not a liquid, stool results. Warm oil enemas at weekly intervals are of value. Hot rectal irrigations of normal saline two or three times a week should be kept up for weeks or months according to the response in each individual case. X-rays of the colon should be taken at six month intervals. The patient should be warned of the danger of obstruction in order that he may report any early obstructive symptoms that may arise. With this type of management even moderately severe cases may go for long periods of time or for life without need of operation. Spriggs and Marxer[4] report a series of twenty-five cases treated medically; of these, sixteen were greatly benefited, eight were much improved, and one received no relief.

Surgical Treatment.—Erdmann[11] believes that as soon as the diagnosis is made all acute cases should be operated upon. He states that there is no more reason to wait or try medical treatment than there is in acute appendicitis or acute tubal infection. This seems to be unnecessarily radical, especially when we consider the magnitude of most surgical procedures on the colon.

Cases which require operation may be divided into the following five groups: (1) acute cases which do not subside when treated medically; (2) acute perforation; (3) abscess formation; (4) chronic inflammatory cases with fistula or obstruction; (5) malignancy.

1. The acute inflammatory symptoms may not subside in any given patient, even with the best conservative care. Pain may increase and the temperature continue to rise. The leukocyte count may increase and the general condition of the patient becomes worse. All of these signs point to a progressive pathological process. Such a case is best treated by bowel drainage proximal to the affected area, either a colostomy in the transverse colon or appendicostomy or cecostomy. Probably a cecostomy is best.

2. An acute perforation must be explored, the opening in the bowel closed and the abdomen drained.

3. In a case presenting a demonstrable abscess, the abscess should be drained extraperitoneally if possible.

4. Cases showing chronic inflammation with obstruction have been treated in many ways. When angulation or kinks are caused by adhesions, Lockhart-Mummery[8] advises the freeing of adhesions and the wrapping of the diseased area with omentum. Primary resection has been done and an end-to-end or side-to-side anastomosis made. Mikulicz and obstructive procedures have been recommended. Short circuiting operations, such as joining the ileum to the sigmoid colon, have been performed. A loop of ileum has been used to connect the transverse colon to the sigmoid; and the descending colon resected as described by Pauchet.[22]

Because there is always a certain amount of infection present, a high mortality is associated with all of these procedures. Before any type of plastic operation is done it should be preceded by a cecostomy or colostomy, and the bowel drained for two or three months. This gives the inflammatory process a chance to subside, and a much safer resection can be performed. Many cases subside to such an extent that no further operating is required, except closure of the colostomy. Before closing a colostomy in such a case it is absolutely essential to know that no lower obstruction is present. At times a permanent colostomy is necessary because the diseased portion of the sigmoid is so low that a resection and an anastomosis cannot be satisfactorily performed.

An attempt to close any fistula caused by diverticulitis should be preceded by a drainage operation of the colon above the inflammatory area. These stage operations cause longer hospitalization, and patients object to colostomy, temporary or permanent. But when the factor of increased safety is considered, preliminary drainage is well worth while.

5. When carcinoma is suspected, resection of the inflammatory mass should always be done. The method of resection depends on the findings at exploration. Colostomy should precede this resection. Daniel Jones[2] states that when bleeding comes from above the anal area in a case of diverticulitis the involved area should always be removed, as there is usually an associated carcinoma.

CASE REPORTS

Case 1.—W. P., a well nourished male, aged seventy, was seen at his home the night of March 22, 1933. He stated that he had been having pain in the left lower abdomen, diarrhea and bleeding from the rectum for the past twenty-four hours. He had a similar attack two years previously except that there was no bleeding at that time. He had been troubled with flatulence for years.

Abdominal examination revealed tenderness and rigidity over the left lower abdomen, and a sausage-shaped mass was felt in the lower left quadrant. Digital rectal examination was negative except for an enlarged prostate. Patient was given paregoric and heat was applied to the lower abdomen. The following day sigmoidoscopic examination was negative except for bleeding internal hemorrhoids. X-ray with barium enema revealed an obstruction at the recto-sigmoid junction.

The following day, x-ray examination showed extensive diverticulitis of the sigmoid colon. The patient was put to bed in the hospital, morphine and atropine were given and heat applied to the abdomen. The bowel symptoms began to subside and the patient felt considerably better. On March 26, 1933, he could not void and required catheterization. The urinary disturbance continued, and it was necessary to insert a retention catheter into the bladder. A cystoscopic examination on March 30 revealed a median bar obstruction, grade 3.

The patient was prepared for prostatectomy, and on April 11, 1933, a transurethral resection of the prostate was done. An easy convalescence followed, and the patient was discharged from the hospital on April 17, 1933. He was instructed to take mineral oil and live on a smooth diet.

This man has been examined at one to three month intervals since leaving the hospital. He is in good health except at times when he eats rough food or neglects his mineral oil. At the last examination three months ago no abdominal tenderness could be found but a mass could be felt. Barium enema revealed the presence of diverticula but no obstruction.

Case 2.—J. K., a moderately obese male, aged forty-five, was examined at the office on March 4, 1932. He stated that two days previously he was taken with severe pain in the left lower abdomen. He had no nausea but had considerable flatulence. He had experienced occasional cramp-like pains in the lower abdomen for the past two years accompanied by diarrhea.

Examination revealed tenderness and rigidity over the lower left abdomen. Digital rectal examination was negative. Temperature was 100°; leukocyte count, 15,000. The patient was sent to the hospital with a tentative diagnosis of diverticulitis of the sigmoid colon. A barium enema confirmed this diagnosis. The patient was put to bed and given morphine and atropine by hypodermic. Hot rectal irrigations were given and heat applied to the abdomen. The next day the patient had more pain and his temperature increased to 101°; the leukocyte count to 17,000. The polymorphonuclear count was 83 per cent. It was thought that a cecostomy should be done. The patient was taken to the operating room and a cecostomy by the Witzel method was performed under gas anesthesia. A moderate postoperative reaction occurred, after which the patient had an uneventful convalescence. The cecostomy closed two weeks after operation. This patient takes mineral oil in one to two dram doses twice a day and lives on a smooth diet. He has had very little abdominal discomfort since his operation.

Case 3.—Mrs. F. M., an obese female, aged fifty, was admitted to the hospital, May 28, 1932. She stated that she was having severe pain in the right lower abdomen. She was nauseated, but did not vomit. Abdominal examination revealed rigidity and tenderness over the right lower abdomen. Her temperature was 100.8°, pulse 100, leukocyte count 13,750. Urine was normal. A diagnosis of acute appendicitis was made. The abdomen was explored, and a mass about two inches in diameter was found in the sigmoid colon. The adjacent epiploic tags were inflamed. The omentum was attached to the mass, which was pulled over to the right side of the abdomen. Penrose drains were inserted about the mass and the abdomen closed. The patient's condition was good at the close of the operation; the next day her temperature and pulse became elevated, the abdomen became distended and her general condition grew worse. On June 1, 1932, a transfusion of 500 c.c. of citrated blood was given intravenously. This did no good and death occurred an hour later, evidently from peritonitis. No autopsy was obtained.

Case 4.—J. B., an obese male, aged forty-nine, was admitted to the hospital, August 5, 1926. He complained of severe pain in the abdomen. He stated that on August 3 and 4 he had had a cramp-like feeling in the lower abdomen. This became worse on the evening of the fourth, and he had severe pain during the night. At 7 a. m., August 5, he called his physician, who sent him to the hospital immediately. Examination revealed a board-like abdomen, leukocyte count 16,000 with 85 per cent polymorphonuclear cells, temperature 100.4°, and the pulse 92. The abdomen was explored under ether anesthesia. An inflamed mass was found in the sigmoid colon, which was brought out of the abdomen as a first stage Mikulicz procedure. The patient had a comparatively easy convalescence. The second and third stages of Mikulicz operation were carried out later. He is in good health at the present time.

Case 5.—L. B. L., a well nourished male, aged forty-seven, was admitted to hospital, June 21, 1928. He stated that for several days he had been passing gas through the urethra. There was no history of pain in the abdomen previous to this. Cystoscopic examination revealed an inflammatory area on the bladder wall. On June 26, the abdomen was opened and a diverticular mass found which was densely adherent to the bladder. This mass was separated from the bladder and brought out of the abdomen as in the first stage Mikulicz procedure. The bladder opening was closed. The patient had a stormy convalescence but gradually improved. He has been free from any urinary or bowel symptoms since his discharge from the hospital, but he has a postoperative hernia.

Case 6.—Mrs. G., an obese female, aged fifty-three, was admitted to the hospital February 6, 1928. She had been having intermittent pain in the left lower abdomen for two years. She was constipated and complained of flatulence. She had lost fifteen pounds in two months. Examination revealed slight tenderness and rigidity in the left lower abdomen. A mass could be palpated over the sigmoid colon. Her temperature was 99 to 100 degrees, pulse 98, leukocyte count 13,045. A barium enema revealed a partial obstruction in the sigmoid colon. This was thought to be due to carcinoma. Operation on February 9, 1928, revealed a mass in the sigmoid colon 5 inches by 2 inches. This mass was mobilized and brought out of the abdomen as in the first stage Mikulicz procedure. The second and third stages were done later. Microscopic examination showed diverticulitis. An abscess developed in the abdominal wound, which was drained on the ninth day after exploration. An uneventful convalescence followed.

Case 7.—E. M., an obese male, aged forty-three, was examined in the office, January 30, 1935. He stated that he was awakened one night, six weeks before, by a desire to void. He passed gas and some blood on micturition. There was some burning. There had been no abdominal pain. He consulted a druggist, who prescribed argyrol injections per urethra. The injections helped the burning but he continued to pass gas. Physical examination was negative except the patient was obese. The urine showed considerable pus. A barium enema revealed many diverticula in the sigmoid colon, but no evidence of inflammation could be demonstrated. An inflammatory area was found on the bladder wall on cystoscopic examination. Methylene blue was injected into the rectum and this returned in the urine. The patient is now being prepared for operation.

Conclusions

1. Diverticulosis and diverticulitis have been properly recognized and treated only within recent years.

2. Diverticulosis occurs in about 5 per cent of all cases studied by colon x-rays. Approximately 12 to 15 per cent of persons with diverticulosis will develop diverticulitis.

3. Diverticulosis is probably caused by increased intracolic pressure and a weakened bowel wall.

4. Diverticulitis is due to irritation and infection occurring in diverticula, particularly in the sigmoid portion of the colon.

5. The severity of symptoms corresponds to the degree of pathological process present.

6. X-ray is a valuable diagnostic aid.

7. The treatment of diverticulosis and mild diverticulitis is medical, and that of severe diverticulitis is surgical.

8. Plastic procedures for the relief of diverticulitis should be preceded by colostomy or cecostomy.

9. Because of the possibility of carcinoma, all bleeding cases should be explored and the mass resected.

Bibliography

1. Ballin, M.: Diverticulitis of the colon. Am. Jour. Surg., 2:130-141, 1927.
2. Bargen, J. A., and Victor, Lister M.: Diet in intestinal disorders. Jour. Am. Med. Assn., 97:150-153, (July 18) 1931.
3. Bell, E. T.: Textbook of Pathology, 1930, pp. 447-478.
4. Benjamin, A. E.: Diverticulitis of the colon and sigmoid—its complications and treatment. Minn. Med., 14:912, 1931.
5. Boyd, William: Surgical Pathology. Saunders, Phil. (2nd ed.), pp. 351-358.
6. Case, J. T.: Diagnosis and treatment of colonic diverticula. Am. Jour. Surg., New Series, 4:573, 1928.
7. Cawadia: Proc. Royal Soc. Med., 20:690-692. 1927.
8. Creveihier, Jean: Traite'd'anatomie et de Pathologique. Paris, 1:590, 1849.
9. David, V. C.: Diverticulosis and diverticulitis with particular reference to development of diverticula of the colon. Surg., Gyn. and Obst., 56:375-381, (Oct.) 1933.
10. DeMartel. Proc. Royal Soc. Med., 20:686-687, 1927.
11. Erdmann, J. F.: Diverticulitis and diverticulosis. Jour. Am. Med. Assn., 99:1125-1128, (Oct. 1) 1932.
12. Gordon-Watson, Sir C.: Diverticulitis. Proc. Royal Soc. Med., 20:681-685, 1927.
13. Graser, Ernst: Ueber multiple falsche darmdivertikel in der flexura sigmoidia. Munchen. med. Wchnschr., 46:721-723, (May 30) 1899.
14. Hunt, Verne C.: Diverticulosis and diverticulitis of the colon. Cal. and West. Med., 40:98-102, 1934.
15. Jones, Daniel F.: Diverticulitis of colon, and its relation to carcinoma. New England Jour. Med., 203:459-461, (Sept. 4) 1934.
16. Judd, E. S., and Pollock, J. W.: Diverticulitis of the colon. Ann. Surg., 80:425-438, 1924.
17. Kauffman, Edward: Textbook of Pathology. Blakiston, Phil., 1:749-750, 1930.
18. Lockhart-Mummery. Proc. Royal Soc. Med., 20:694-696, 1927.

19. McGrath, B. F.: Intestinal diverticula; their etiology and pathogenesis with a review of 27 cases. Surg., Gyn. and Obst., 15:429-444, (Oct.) 1912.
20. Mayo, W. J., Wilson, L. B., and Giffin, H. Z.: Acquired diverticulitis of the large intestine. Surg., Gyn. and Obst., 5:8-15, (July) 1907.
21. Mayo, W. J.: Diverticulitis of the sigmoid. Collected Papers of Mayo Clinic, pp. 227-233, 1929.
22. Pauchet, Victor: Proc. Royal Soc. Med., 20:687-689, 1927.
23. Rankin, F. W., and Brown, P. W.: Diverticulitis of the colon. Surg., Gyn. and Obst., 50:836-847, (May) 1930.
24. Rowlands, R. P.: Proc. Royal Soc. Med., 20:692-693, 1927.
25. Shires, Bertram: Diverticulitis. Proc. Royal Soc. Med., 20:686, 1927.
26. Sistrunk, W. E.: Personal communications.
27. Spriggs, Edmund I., and Marxer, E. O.: Proc. Royal Soc. Med., 20:665-681 and 696-697, 1927.
28. Strachauer, A. C.: Personal communications.
29. Telling, W. H. M., and Gruner, O. C.: Acquired diverticula, diverticulitis, and peridiverticulitis of large intestine. Brit. Jour. Surg., 4:468-530, 1916-17.
30. Virchow. Quoted by McGrath.
31. Warwick. Turner: Proc. Royal Soc. Med., 20:693-694, 1927.
32. Wilkinson, S. Allen: Diverticulosis and diverticulitis of the colon. New England Jour. Med., 209:197-202, (July 27) 1933.

Discussion

Dr. E. T. Bell: Dr. Jones has given us a good general survey of this field. I might comment a little on the basic principles involved in diverticulosis. The same fundamental principle obtains here as in a femoral or inguinal hernia, the weakness of the wall and the increased pressure from the inside.

In some parts of the intestinal tract, like the small intestine, there is no doubt that congenital weakness of the wall is the most important factor. The muscle wall is thin where the large blood vessels come in on the mesenteric border and the diverticulum dissects along through the defect in the wall made by these blood vessels. In the small intestine, diverticula are very rare in comparison with the sigmoid and they are very seldom recognized clinically. In our experience we have had only one clinical case of diverticulitis in the small intestine. Death resulted from the infection. The roentgenologists will tell you they often see diverticula in the duodenum but that they seldom cause symptoms. In the pelvic colon we think there is a congenital factor also, but it is less important than in other situations.

The factor of distention is very important. The muscle layers are spread out over the wall of the intestine but often quite unevenly. If you study a colon you will see the three longitudinal bands of muscle with big defects between them. The layer of muscle is not uniform everywhere and when the intestine is put under the tension, chiefly from gas, as Dr. Jones points out, the hernia starts through these little places where the muscle is not so strong, always on the antimesenteric border. We cannot get away from the fact that there must be a primary weakness of the wall, due to the uneven distribution of the muscle. The hernia at times goes out into the epiploic appendage. This fact gives rise to the theory that the infiltration of adipose tissue weakens the wall. Another thing we have to consider besides the fecalith is stasis in the diverticula. The fecalith is the more important—the stool gets hard and irritates the mucosa; but some develop diverticulitis without the fecalith. If you examine the intestine from the inside, the opening into the diverticulum is seen to be quite small in comparison with the size of the sac. Stasis of fecal contents increased the virulence of bacteria.

In the small bowel, bacteria are much less numerous and there is therefore less tendency to the development of infection. In the duodenum there are very few bacteria and diverticulitis is very rare. The bladder is a good example of diverticulitis where the congenital factor is prominent. The muscle bundles are unevenly distributed and they are pulled apart when the viscus is distended. There must be stretching before the diverticulum is formed. The diverticulum itself is not congenital. Studies have been made on the sigmoid in different stages. At first the diverticula are few and small and later they are more numerous and larger. They develop while the patient is under observation.

Dr. E. C. Robitshek: In these cases of diverticulosis and acute diverticulitis I should like to emphasize the need of extreme caution in the use of enemas as a therapeutic measure, because of the likelihood and danger of causing a perforation. I have had but few of these cases and when I thought I had recognized one, I would not permit the use of an enema.

Dr. L. Haynes Fowler: While listening to Dr. Jones' very interesting paper and particularly in respect to his observation on the relation of diverticula to intracolic pressure, it struck me as a rather curious fact that I have never seen the report of a case in which diverticula were associated with megacolon although distention and pressure are at their maximum in this condition. I suppose this may be partially be explained by the large amount of muscular hypertrophy which is present in cases of megacolon.

Dr. O. J. Campbell: I did not hear Dr. Jones mention the associated spasm which may accompany acute diverticulitis. I recall one patient in whom the picture was that of a very acute abdomen except for a low leukocyte count and no fever. The following day every symptom had subsided. Diverticula were demonstrated by x-ray. The assumption was that a low grade inflammatory process was present in one of the diverticula but his symptoms could be explained only on the basis of spasm. I am under the impression that such an association is frequent.

Dr. J. A. Johnson: When diverticulitis occurs in the pelvic sigmoid it is very difficult to handle surgically. Many of these cases perforate and become attached to the posterior abdominal wall in the pelvis. They are difficult to distinguish from carcinoma but, fortunately, the x-ray often gives us quite a definite picture that we can rely upon. Many of these cases progress very nicely under medical management, even though a marked degree of obstruction is present. If anything is done, surgically, the tumor should not be dissected free because there is great danger of peritonitis. A colostomy should be done. Under this management, if they are not malignant, the great majority of them subside. When perforation has taken place it is dangerous to operate primarily upon the diverticulitis.

Dr. William T. Payton: My experience with this lesion is that it involves a greater area of the bowel than carcinoma and it gives a longer history than one would get with carcinoma.

At the time this lesion is operated upon, if you are still in doubt as to whether or not it is malignant, it is of value to recall that in diverticulitis there are inflammatory changes and you see adhesions with increased vascularity everywhere in evidence. In the x-ray, particularly, you note the spasm which has been mentioned tonight in cases of diverticulitis. In carcinoma that part of the bowel which is involved appears rigid in the screen and film with no peristalsis in the area involved. I have seen a case of diverticulitis that had been operated on seven years previously, a colostomy having been done. The family had been told that the patient had carcinoma. They were still wondering why she had not died.

Dr. W. R. Jones: Spasm might occur in diverticula due to irritation from a fecalith. However, I believe that this is infrequent and that usually there is an inflammatory process present. This inflammation, many times, subsides very quickly.

MEGACOLON

With Report of a Case Caused by a Traumatic Anal Stricture

Treatment by Left Lumbar Sympathectomy

L. Haynes Fowler, M.D.

(Paper to appear later in Minnesota Medicine)

Summary

Megacolon is a term used to describe any dilated, hypertrophied colon. It may be either congenital or acquired. Congenital, idiopathic megacolon (Hirschsprung's Disease) is a clinical entity usually seen in infancy or early childhood. It is characterized by a hugely dilated hypertrophied colon with obstipation and abdominal distention. It is considered to be of neurogenic origin although the exact etiological factors are unknown. Medical and surgical treatment have been unsatisfactory until the advent of a method of surgical attack upon the sympathetic nervous system.

Various operative procedures on the abdominal sympathetic nerves have been developed for the treatment of this disease, the object of which is to remove the sympathetic nerves which supply the portion of the bowel chiefly affected. All of these operations are based on the fairly well established physiological principle that the sympathetic nerves are inhibitors of the smooth muscle of the bowel wall and contractors of the internal sphincter muscles. Overactivity of these nerves causes dilatation of the bowel and contraction of the sphincters. Sufficient experimental and clinical evidence has been offered to prove the value of sympathetic nerve resection in properly selected cases of megacolon.

A case is reported of a girl, twenty-two years of age, with a hugely dilated rectum and sigmoid colon filling the entire abdomen, in whom we resected the left lumbar sympathetic trunk and ganglia, twenty-one months ago. Very satisfactory results have been obtained in this case as demonstrated by clinical improvement and x-ray plates taken after a barium enema. This patient had most of the classical features of a typical congenital megacolon (Hirschsprung's Disease) but had the additional element of a traumatic anal stricture developing at six months of age. This was incised and the stricture apparently relieved (at seven years of age) without inhibiting the further progress of the disease. We believe, therefore, that this must be considered as a case of acquired megacolon due to obstruction from a traumatic anal stricture resulting from a burn sustained soon after birth. The mechanical obstruction, which was present for six and one-half years, apparently caused such an interference with the neuromuscular mechanism of the bowel that the latter continued in a state of increasing imbalance for thirteen and one-half years after the mechanical obstruction had been relieved. Restoration of normal bowel function has been obtained by left lumbar sympathectomy after twenty years of dysfunction.

Discussion

Dr. J. C. McKinley: Dr. Fowler has certainly given a very clear presentation of the neural mechanisms involved in the operative procedure for this condition. A number of questions occurred to me in connection with the data presented. As far as I can find, there is no clear understanding of the exact course of the sacral fibers from the point where they enter the hypogastric plexus to their final distribution in the descending part of the colon. Certainly they do not go along with the sympathetic fibers. I am wondering if Dr. Fowler has seen anything in the literature on that specific point.

The observation on this case, with spinal anesthesia, is interesting. I do not think it is quite fair to assume that, because the bowel is more active during the anesthetic, the autonomic is therefore acting normally, for at least the sacral autonomic must be paralyzed at the same time.

I wonder if peripheral mechanisms may not be overlooked as a factor in the cures one gets with this type of surgery. There, doubtless, are peripheral reflexes in the bowel itself. It has been shown *(Kuntz, Autonomic Nervous System)* that sharp pointed objects in the bowel will come to take up a certain position. A pin apparently will point with the head downward toward the anus. If the point of the pin gets into the mucosa it is said that the mucosa will actually retract from that point.

The return of rectal continence after the sympathectomy, in Dr. Fowler's case, is an interesting phenomenon. There is a special situation relative to the control of the anus because the nerves to the voluntary sphincter have not been disturbed. It may be that by the release of pressure with cure of the megacolon, the voluntary sphincter has an opportunity to work under more normal pressure conditions, and thus to become competent again.

Dr. E. C. Robitshek: Dr. Fowler mentioned something in the recent literature about the use of spinal anesthesia in these cases which I recall reading. This was an article by Stabins* and his associates in which they reported five cases of megacolon in which spinal anesthesia has resulted in a marked improvement in the motor function of the bowel. In their cases, improvement has continued to the point of practically complete relief of symptoms without having to repeat the spinal anesthesia. They recommend the use of spinal anesthesia as a pre-operative index because, where a positive motor response is shown, the results of sympathectomy are very satisfactory. However, in addition, before considering sympathectomy, the effect of spinal anesthesia on the course of the disease should be considered as this procedure alone may be sufficient.

Dr. E. T. Bell: I have seen two cases where the proximal half of the colon showed this condition, not the distal half. There is a fundamental problem here which is very hard to understand. These patients, with megacolon, have marked hypertrophy of the muscle wall but they do not show increased peristalsis. In the obstruction, due to carcinoma, there is increased peristalsis in the earlier stages but I do not know whether that continued over into the stage of massive megacolon or not. Here is a colon which develops a tremendous hypertrophy of the muscle, but shows no obstruction of any kind and no increased peristalsis. How are we going to account for this muscle hypertrophy? Can we suppose that stretching causes muscle hypertrophy?

Dr. R. T. Knight: I did not quite understand Dr. McKinley's remark about the autonomic. I presume he means the sacral parasympathetic. Does the sacral parasympathetic innervate the lower one-half of the colon as it does the pelvic structures, the uterus, etc., or does the vagus supply the parasympathetic innervation to the lower part of the colon?

Dr. J. C. McKinley: As far as I can discover, the sacral outflow apparently does innervate most of the descending part of the colon. How much additional autonomic innervation comes down from above is a question that has not been entirely elucidated and that, of course, is very pertinent in relation to the results under spinal anesthesia.

Dr. R. T. Knight: This is a little bit aside, but the question of anesthesia in general, in connection with these things and with the ordinary normal bowel, is rather interesting. We see, under spinal anesthesia, our entire bowel contracted in the abdomen and under ether anesthesia we usually see a somewhat dilated bowel because deep ether anesthesia begins to inhibit the entire parasympathetic, including the vagus. Under cyclopropane, apparently the parasympathetic is left entirely unaffected even when great muscular relaxation has been accomplished. We then usually see the bowel contracted in the abdomen almost the same as in spinal anesthesia, a complete inhibition of the sympathetic but the parasympathetic being left quite unaffected.

Dr. L. Haynes Fowler: I wish to thank the gentlemen for their very kind and interesting discussion of this paper. I think this discussion has brought out the fact that there is a great deal that is yet unknown about the anatomy and physiology of the sympathetic nervous system in general, and its relation to the large bowel, in particular. In my survey of the literature, it was evident that the best authorities are at variance on a great many points. The proximal half of the colon is supposed to receive its parasympathetic nerve supply through the vagus, while the distal half of the colon, rectum and internal sphincter ani are supplied by visceral rami of the second, third and fourth sacral nerves. Just how these sacral fibers reach the descending colon and sigmoid is not well established.

As to the point Dr. McKinley brings out, it is quite universally agreed that there is a definite intrinsic neuro-muscular mechanism in the bowel wall itself which will function to a certain extent even though both the sympathetic and parasympathetic nerves have been severed.

As to Dr. Bell's question regarding the involvement of the proximal one-half of the colon, there is a considerable group of cases reported in which the proximal as well as the distal half of the colon is dilated. However, it would be very unusual to find the proximal half alone involved. The maximal dilatation is found in the descending colon in the majority of cases and in the sigmoid in over 50 per cent of cases.

In regard to Dr. Bell's question as to how much peristalsis is found in obstructive cases, I cannot answer that definitely. In cases such as the one reported tonight in which an obstructive element was undoubtedly present but which was of a slow chronic nature, peristalsis would be absent. If the obstruction were more acute and of shorter duration, I would expect to see more evidence of the presence of peristalsis. Rankin reports that specimens removed from patients with megacolon due to obstruction by malignant growths show definite muscular hypertrophy similar to that found in the true congenital type of megacolon.

The case reported tonight, I believe, should be classed as one of megacolon initiated, in all probability, by a traumatic anal stricture. The typical pathological and clinical picture of a congenital megacolon was produced. Left lumbar ganglionectomy and ramisection have given a very satisfactory result as evidenced both by the clinical improvement of the patient and x-ray plates of the colon after a barium meal.

Respectfully submitted,
F. A. Olson, *Secretary.*

Hydrochloric Acid in Hay Fever.—Beckman (J. Allergy, 1:496 (Sept.) 1930) reported 67 per cent of complete or marked relief in 237 hay fever cases by the oral administration of nitrohydrochloric acid; this figure was about equal to that obtained by leading allergists with the usual desensitization method of injections of specific pollen extracts. Many other workers have argued this point both before and after Beckman's article, and the consensus, especially among leading allergists, is about as follows: 1. No one has proved that hay fever or other allergic disease is due to a lack of acid (*i.e.,* an alkalosis). 2. Although the method has been tried by many allergists, in general it has not been successful in alleviating the symptoms of hay fever. The intravenous injection of dilute hydrochloric acid recently advocated in allergic conditions is not without danger; its usefulness in these disorders is quite questionable. (Jour. A. M. A., September 22, 1934.)

---

*Stabins, Morton and Scott: Spinal anesthesia in the treatment of megacolon and obstinate constipation. Am. Jour. Surg., 27:107, (Jan.) 1935.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

Names of Surgical Operations. Compiled and arranged by the Western Surgical Association through its Special Committee. 102 pages. Price, cloth, $3.00. St. Paul: Bruce Publishing Company, 1935.

The Modern Method of Birth Control. Thurston Scott Welton, M.D., F.A.C.S., Editor of American Journal of Surgery. 159 pages. Illus. Price, cloth, $3.00. New York: Walter J. Black, Inc., 1935.

Surgical Pathology of the Peritoneum. Arthur E. Hertzler, M.D., Surgeon to Agnes Hertzler Memorial Hospital, Halstead, Kansas, Professor of Surgery, University of Kansas. 305 pages. Illus. Price, cloth, $5.00. Philadelphia: J. B. Lippincott Co., 1935.

Autonomic Diseases of the Rheumatic Syndrome. T. M. Rivers, M.D. Author of Focal Infections, the Resulting Morbidity and Treatment of Same, etc. 299 pages. Price, cloth, $3.00. Philadelphia: Dorrance & Co., Inc., 1935.

Doctors and Juries. Humphreys Springstun, of the Detroit Bar. 155 pages. Price, flexible binding, $2.00. Philadelphia: P. Blakiston's Son & So., Inc., 1935.

A textbook of Biochemistry. Benjamin Harrow, Ph.D., Associate Professor of Chemistry, College of City of New York, and Carl P. Sherwin, M.D., Sc.D., Dr.P.H., LL.D., Member of Staff of St. Vincent's and French Hospitals, New York. 797 pages. Illus. Price, cloth, $6.00. Philadelphia: W. B. Saunders Co., 1935.

Economic Problems of Medicine. A. C. Christie, M.S., M.D., Professor of Clinical Radiology, Georgetown University Medical School, etc. 242 pages. Price, cloth, $2.00. New York: The MacMillan Company, 1935.

USEFUL DRUGS: A LIST OF DRUGS SELECTED TO SUPPLY THE DEMAND FOR A LESS EXTENSIVE MATERIA MEDICA WITH A BRIEF DISCUSSION OF THEIR ACTIONS, USES AND DOSAGE. Edited by Robert A. Hatcher, Ph.M., Sc.D., M.D., and Cary Eggleston, M.D. Prepared under the Direction and Supervision of the Council on Pharmacy and Chemistry of the American Medical Association. Ninth edition. Cloth. 203 pages. Price, 60 cents. Chicago: American Medical Association, 1934.

This book represents a valuable and increasingly effective phase of the efforts of the Council on Pharmacy and Chemistry on behalf of rational therapeutics. Since its first appearance in 1913 it has become a recognized work in its field. It has been adopted as a textbook by teachers of therapeutics in the best medical schools and by various examining and licensing boards. The various editions and revisions since that time have been undertaken in the effort to keep it abreast with the advance of therapeutics. Drugs that have become obsolete have been deleted, and others the value of which has become established have been added. The statements of actions, uses and dosage of the various drugs are revised after discussion by the whole Council. They represent the latest and best results of therapeutics and pharmacologic revision. The present edition is in line with the constant aim of the Council, which has been to present a selective and informative yet comprehensive compendium of the more useful preparations in the medical armamentarium. There have been some additions to the list of drugs and a few have been deleted. Individual descriptions show evidence of careful editing. Typographically the text is an improvement on previous editions by reason of more generous spacing, which makes it easier on the eyes. As is stands, the book is an authoritative, inteligent, critical and entirely adequate textbook for the use of teachers and examiners, as well as for reference by the busy practitioner. It is an integral and constructive part of the Council's efforts in the promotion of the rational use of drugs.

CLINICAL GYNECOLOGY. C. Jeff Miller, M.D. 560 pages. Illus. Price $10.00. St. Louis: C. V. Mosby Co., 1932.

It has been said that Gynecologists may be divided into two groups; those who are cancer minded and those who are not. Doctor Miller has shown in his book that he can be classed in the former group.

This book contains many excellent pointers upon practical therapeutics in gynecology which are of value not only to the specialist but also to the general man. Stress is laid upon conditions which are most commonly seen and Doctor Miller's advice is that of the best. Technique of many procedures is sketchy but the main principles and tenets are plainly stated and emphasized.

The handling of the chapter upon Irradiation in Gynecology is commendable, but I believe more emphasis should have been laid upon the associated use of radium and x-ray, especially in malignancies. His chapter upon the endocrines is brief and to the point and no extra space is filled with descriptions of treatment with preparations of questionable value.

This is a book which is well written and organized and it can be highly recommended to all.

E. M. Kasper, M.D.

METHODS OF TREATMENT. Logan Clendening, M.D., Clinical Professor of Medicine, University of Kansas. Fifth Edition, 879 pages. Illus. Price $10.00. St. Louis: The C. V. Mosby Company, 1935.

Many books on medical therapeutics have "come and gone" and only a few have succeeded in more than one edition. Logan Clendening and his collaborators have succeeded in keeping up to date his well known book on Methods of Treatment. It first appeared in 1924 and now in 1935 is in its fifth edition. In this thoroughly revised book, only the "tried by trial" methods of treatment are listed, and such drugs as have proved helpful in the hands of the author have been advocated.

Truly the aim of the author has been reached in describing each method of procedure so clearly and minutely that a person who has never seen it performed could do it from the description.

The book is to be recommended, both to the student and to the gradute in medicine.

J. S. B.

THE CRIPPLED AND DISABLED. Henry H. Kessler, M.D. 337 pages. Price $4.00. New York: Columbia University Press, 1935.

This is a work outlining the problems of the physically disabled in coping with his environment. Rehabilitation and compensation legislation and agencies of the United States and foreign countries are compared, and further work along these lines suggested. The author feels the main problem to be one of vocational maladjustment due in large part to prejudice against the disabled which can only be adjusted by propaganda and education. The need of more accurate criteria for estimating disability is emphasized.

S. W. Shimonek, M.D.

INTRODUCTION TO DERMATOLOGY. Richard L. Sutton, M.D., Professor of Dermatology, University of Kansas and Richard L. Sutton, Jr., M.D., Assistant in Dermatology, University of Kansas. 565 pages. Illus. St. Louis: C. V. Mosby Company, 1932.

The title of this book describes it very well. It is a concise, well written outline with enough text to make it of value to the practitioner as well as the student. The material included in this book covers the field of dermatology very well, but for detailed study a more complete textbook would be found necessary.

L. R. Critchfield, M.D.

WHAT YOU SHOULD KNOW ABOUT HEART DISEASE. Harold E. B. Pardee. 2nd revised edition. Philadelphia: Lea & Febiger, 1935. Price $1.50, pp. 127. Illus.

For a long time it has been the reviewer's practice in dealing with patients with heart disability to explain as concisely as possible the causes and effects of the condition present. To dispel fear and instill confidence is one of the desirable therapeutic adjuncts of any treatment to be instituted, and securing the necessary coöperation of the patient materially aids the physician in his care of the patient. I have previously made use of Dr. Pardee's first edition, which is the best book of its kind that I know of. Dr. Pardee talks to the patient directly in non-technical language to the end that one ordinarily intelligent may comprehend just what is meant by heart disease, the nature of the disability, and how to coöperate properly with the physician in trying to correct the unpleasant results of the disease. The book is well arranged and is sufficiently comprehensive since it includes chapters on diets, rest and exercise, medicinal treatment and prognosis. The book ends with a word on the necessary limitations imposed and the necessity of avoiding undue stress and strain and with the admonition, "Learn to say 'No.'"

Many will find this little volume to be of definite assistance to them in helping their patient. I enthusiastically recommend it for the purpose for which it was intended.

T. A. Peppard, M.D.

COMPARABILITY OF MATERNAL MORTALITY RATES IN THE UNITED STATES AND CERTAIN FOREIGN COUNTRIES: Bureau Publication No. 229, U. S. Dept. of Labor, Children's Bureau. By Elizabeth C. Tandy, D.Sc.

This pamphlet gives the report of a subcommittee of the Committee on Prenatal and Maternal Care of the White House Conference on Child Health and Protection, of which Dr. Fred L. Adair was chairman. A table showing the maternal mortality rates from 1925 to 1933 of certain countries, together with the conclusions drawn by the author from the study follow. The Minnesota rates have been added for comparison.

DEATHS ASSIGNED TO PREGNANCY AND CHILDBIRTH PER 10,000 LIVE BIRTHS

Country	1925	1926	1927	1928	1929	1930	1931	1932	1933
United States	64.7	65.6	64.7	69.2	69.5	67.3	66.1	63.3	61.9
Minnesota	51.5	57.9	42.6	52.5	42.6	53.5	48.5	45.0	43.4
Australia	56.4	53.0	59.2	59.8	50.8	53.0	54.8	55.7	51.3
Canada	56.4	56.6	55.5	56.2	57.0	57.7	50.5	50.2	49.7
Chile	61.1	58.3	57.7	58.6	77.8	67.7	75.0	71.0	....
Czechoslovakia	33.3	34.0	35.8	39.7	42.8	40.7	41.4	42.8	48.5
Denmark	23.6	26.6	30.6	27.0	31.7	38.3	40.5	35.0	36.5
England and Wales	40.8	41.2	41.1	44.2	43.4	44.0	41.1	42.1	43.2
Estonia	38.2	40.5	41.1	50.3	46.0	49.3	42.5	33.9	....
France	23.8	24.4	28.7	29.0	29.3	26.7	24.9	....	....
Irish Free State	46.9	48.9	45.1	49.3	41.0	47.6	43.1	45.5	....
Italy	28.1	25.5	26.4	28.0	28.8	27.2	27.8	29.8	....
Netherlands	26.3	28.7	29.0	33.6	33.5	33.3	32.0	30.2	31.6
New Zealand	46.5	42.5	49.1	49.3	48.2	50.8	47.7	40.6	44.4
Northern Ireland	44.4	56.1	48.0	52.4	49.2	52.9	51.4	53.4	....
Norway	26.8	31.8	24.5	30.3	36.2	30.3	27.0	26.4	....
Scotland	61.6	64.0	64.3	69.8	68.7	69.5	59.1	63.3	59.2
Sweden	26.3	29.4	27.8	33.0	37.9	34.8	36.8	26.6	....

The study shows: That the methods of assignment in use in Australia, Netherlands, New Zealand, and Scotland are similar to that of the United States, and the official maternal mortality rates are directly comparable within a small margin of error; that under the method of Denmark a larger number of deaths would be assigned to the puerperal state and the rate for the United States would be significantly higher than it is now; that under the methods of the other countries included in the study—Canada, Chile, Czechoslovakia, England and Wales, Estonia, France, Irish Free State, Italy, Northern Ireland, Norway, and Sweden—a smaller number of deaths would be assigned to the puerperal state and the rates for the United States would consequently be somewhat lower. Second: That differences in methods of assignment are insufficient to explain the high maternal mortality rate of the United States as compared with foreign countries. The official figure of the United States, which in the last few years has exceeded that of every country except Scotland, remains high no matter what method of assignment is used. Even if the method of the country assigning the smallest proportion of deaths to the puerperal state were in use in the United States, the United States figure would still exceed that of all the countries except Australia, Canada, Chile, and Scotland. Rates for the United States estimated in accordance with the assignment procedure of the respective countries are in every instance except Scotland in excess of and are in five instances more than double the official rates of the countries themselves. No matter what method of procedure is used the United States retains an exceedingly high rate as compared with other countries.

Difference in definition of live births is shown to have a negligible effect upon maternal mortality rates. Incompleteness of birth registration has more weight, but it, too, is insufficient to account for more than a few points of the excess of the United States rate over those of most foreign countries. Neither factor is of great importance in connection with comparability.

E. C. Hartley, M.D.

MARTINI'S PRINCIPLES AND PRACTICE OF PHYSICAL DIAGNOSIS. Edited by Robt F. Loeb, Translated by George J. Farber. 213 pp. Illus. Price $2.00. Philadelphia: J. B. Lippincott Co., 1935.

This reviewer gladly welcomes this volume on physical diagnosis. No one is better qualified for its authorship than Dr. Martini, a pupil of Friedrich von Miller. Especially pertinent, instructive and lucid is the section on the physics of diagnostic acoustics. The book is well arranged and adequately indexed. At the end of the chapters on the Respiratory Tract and the Circulatory System is given a synopsis to correlate the foregoing discussions with the physical findings as they usually appear in the various disease states. There is a good chapter on examination of the abdominal organs.

I unhesitatingly recommend this book to students of physical diagnosis and it is not at all out of place in the library of any practitioner.

T. A. Peppard, M.D.

ADRENAL CORTEX EXTRACT

After a consideration of the several names suggested for the extract containing the hormone of the adrenal cortex, and for the hormone itself, the Council decided that it would be advisable at this time to adopt a generally descriptive nonproprietary name for the more or less crude extracts and to defer until later the consideration of a name for the active isolated principle. The Council therefore adopted the title "Adrenal Cortex Extract" (with the Latin synonym "Extractum Adrenali Corticis") as its nonproprietary name for extractive preparations from the adrenal gland that contain the cortical hormone necessary for life. (*Jour. A. M. A.*, January 12, 1935, p. 121.)

TRYPSOGEN-CARNRICK

Notwithstanding the vast amount of research that has been published on the treatment of diabetes, the G. W. Carnrick Company, Newark, N. J., continues to recommend "Trypsogen" as "a valuable therapeutic agent" in the treatment of this disease. Over the years, "Trypsogen" has had a variety of formulas. Once even such inorganic compounds as gold bromide and arsenic bromide were included in it. It has never been demonstrated that Trypsogen contains insulin, yet insulin is, of course, "the special internal secretory substance" that controls normal carbohydrate metabolism, as claimed by the firm. Today the use of pancreatic extracts by mouth in diabetes is ignorant, unscientific and absolutely without warrant. The doctor who gives such preparations by mouth to the exclusion of the well established and effective methods of treatment involving proper control of the diet and the use of insulin might well be charged with failing to give his patient the ordinary scientific care expected from any average physician in such a condition. Not satisfied, however, with the money it extracts from patients with diabetes, the firm has recently suggested the use of the product "as an adjunct in hypertension." Obviously there is not the slightest scientific evidence to indicate that it has merit in hypertensive disorders. (Jour. A. M. A., Dec. 8, 1934, p. 1782.)

MIN-AMIN

The Bureau of Investigation reports that during the past few months a large number of inquiries have been received asking for information on a preparation for the treatment of obesity known as "Min-amin." The only information regarding the composition of Min-amin that appears on the trade package is the vague statement that it is "a combination of pure food concentrates containing minerals and vitamins." The product is manufactured by the National Institute of Nutrition, Los Angeles, and is recommended for the treatment of obesity by Dr. William Brady, whose syndicated health columns appear in a number of papers throughout the country. Dr. Brady propounds the thesis that much good, wholesome food is deficient in vitamins and minerals, and that the obese eat more food than their bodies require because of an unsatisfied hunger allegedly due to the fact that they are getting insufficient vitamins and minerals. He recommends the use of Min-amin and says: "With Min-amin, which is a concentrate of the essential minerals and vitamins in the proper proportion this deficiency of everyday diet is corrected. . . ." One original specimen of Min-amin was examined in the A. M. A. Chemical Laboratory and found to consist essentially of a relatively pure sample of wheat germ. Essentially, the directions are for the obese to eat no breakfast and no luncheon, but to take instead of each of these meals a rounded teaspoonful of Min-amin in an eight-ounce glass of freshly-made unstrained orange juice. For dinner, or the evening meal, they must eat no breadstuffs, no potatoes, no fats, no sweets, and if a salad is used, it should be made with mineral oil. The obese are told that this regimen does not constitute "self-denial!" No definite statements are made regarding which vitamins are present in Min-amin, nor is there any hint, either in terms of recognized vitamin units or otherwise, as to *how much* of each vitamin may be present! Wheat germ is rich in vitamin B. On the Min-amin theory, then, one would be led to expect that the obese had an unsatisfied hunger because of lack of vitamin B in their normal diet. The facts are, however, that it is rather generally held that lack of vitamin B in the diet definitely causes a *loss* of appetite instead of an *increase* of appetite. (*Jour. A. M. A.*, January 26, 1935, p. 335.)

MINNESOTA STATE MEDICAL ASSOCIATION

ROSTER 1935

OFFICERS

W. A. Coventry, M.D.	*President*	Duluth
A. G. Chadbourn, M.D.	*First Vice President*	Heron Lake
E. S. Boleyn, M.D.	*Second Vice President*	Stillwater
E. A. Meyerding, M.D.	*Secretary*	Saint Paul
W. H. Condit, M.D.	*Treasurer*	Minneapolis

COUNCILORS*

First District

H. Z. Giffin, M.D. (1935)	Rochester

Second District

L. L. Sogge, M.D. (1935)	Windom

Third District

H. M. Workman, M.D. (1937)	Tracy

Fourth District

J. S. Holbrook, M.D. (1936)	Mankato

Fifth District

G. A. Earl, M.D. (1937)	Saint Paul

Sixth District

J. M. Hayes, M.D. (1936)	Minneapolis

Seventh District

W. W. Will, M.D. (1937)	Bertha

Eighth District

W. L. Burnap, M.D. (1936)	Fergus Falls

Ninth District

B. S. Adams, M.D. (1935)	Hibbing

HOUSE OF DELEGATES, AMERICAN MEDICAL ASSOCIATION*

Members

H. M. Johnson, M.D. (1936)	Dawson
W. F. Braasch, M.D. (1936)	Rochester
J. T. Christison, M.D. (1935)	Saint Paul

Alternates

G. A. Earl, M.D. (1936)	Saint Paul
W. L. Burnap, M.D. (1936)	Fergus Falls
E. A. Meyerding, M.D. (1935)	St. Paul

SCIENTIFIC COMMITTEES

(C.M.—Indicates Consulting Member)

COMMITTEE ON SCIENTIFIC ASSEMBLY

W. A. Coventry, M.D.	*President*	Duluth
A. G. Chadbourn, M.D.	*First Vice President*	Heron Lake
E. A. Meyerding, M.D.	*Secretary*	Saint Paul

SECTION ON MEDICINE

F. H. K. Schaaf, M.D.	Minneapolis
P. P. Vinson, M.D.	Rochester

SECTION ON SURGERY

H. B. Zimmermann, M.D.	Saint Paul
Harry Klein, M.D.	Duluth

CLINICAL DEMONSTRATIONS

W. A. O'Brien, M.D. (C.M.)	Minneapolis

LOCAL ARRANGEMENTS

J. K. Anderson, M.D.	Minneapolis

COMMITTEE ON HOSPITALS AND MEDICAL EDUCATION

C. A. McKinlay, M.D.	Minneapolis
O. E. Bratrud, M.D.	Thief River Falls
W. C. Carroll, M.D.	St. Paul
J. R. Manley, M.D.	Duluth
C. W. Mayo, M.D.	Rochester

HEART COMMITTEE

F. J. Hirschboeck, M.D.	Duluth
D. P. Head, M.D.	Minneapolis
C. N. Hensel, M.D.	Saint Paul
F. A. Willius, M.D.	Rochester

COMMITTEE ON CANCER*

Martin Nordland, M.D. (1936)	Minneapolis
W. A. O'Brien, M.D. (C.M.) Vice Chairman (1936)	Minneapolis
F. G. Carter, M.D. (1936)	Saint Paul
A. G. Chadbourn, M.D. (1935)	Heron Lake
H. C. Cooney, M.D. (1937)	Princeton
J. F. Corbett, M.D. 1936)	Minneapolis
O. J. Hagen, M.D. (1936)	Moorhead
A. D. Haskell, M.D. (1935)	Alexandria
O. W. Holcomb, M.D. (1935)	Saint Paul
J. R. Manley, M.D. (1937)	Duluth
M. S. Nelson, M.D. (1937)	Granite Falls
H. E. Robertson, M.D. (1935)	Rochester
A. E. Sohmer, M.D. (1936)	Mankato
P. E. Stangl, M.D. (1937)	St. Cloud
B. F. Van Valkenburg, M.D. (1935)	Long Prairie
Waltman Walters, M.D. (1937)	Rochester

COMMITTEE ON DIABETES

R. M. Wilder, M.D.	Rochester
Moses Barron, M.D.	Minneapolis
A. H. Beard, M.D.	Minneapolis
R. C. Hunt, M.D.	Fairmont
E. J. Kepler, M.D.	Rochester
W. A. Stafne, M.D.	Moorhead
D. W. Wheeler, M.D.	Duluth

INTERPROFESSIONAL RELATIONSHIP COMMITTEE

James Blake, M.D.	Hopkins
J. J. Catlin, M.D.	Buffalo
A. B. Stewart, M.D.	Owatonna

HISTORICAL COMMITTEE

A. S. Hamilton, M.D.	Minneapolis
J. M. Armstrong, M.D.	Saint Paul
Richard Bardon, M.D.	Duluth
W. F. Braasch, M.D.	Rochester
L. O. Dart, M.D.	Minneapolis
Olga Hansen, M.D.	Minneapolis
H. M. Workman, M.D.	Tracy

COMMITTEE ON MILITARY AFFAIRS

Lieut. Col. F. L. Smith	Rochester
Major Martin Aune	Minneapolis
Major L. J. Holmberg	Canby
Capt. C. W. Rumpf	Faribault
First Lieut. B. B. Souster	Saint Paul
Capt. S. E. Urberg	Duluth

COMMITTEE ON SCHOOLS FOR LABORATORY TECHNICIANS

L. G. Rigler, M.D.	Minneapolis
A. U. Desjardins, M.D.	Rochester
Kano Ikeda, M.D.	Saint Paul

COMMITTEE ON PUBLIC HEALTH NURSING

E. S. Boleyn, M.D.	Stillwater
L. H. Bendix, M.D.	Annandale
C. E. Caine, M.D.	Morris
T. E. Flinn, M.D.	Redwood Falls

DEAFNESS PREVENTION AND AMELIORATION

Horace Newhart, M.D.	Minneapolis
W. L. Burnap, M.D.	Fergus Falls
C. E. Connor, M.D.	Saint Paul
J. T. Schlesselman, M.D.	Mankato
D. L. Tilderquist, M.D.	Duluth
G. H. Walker, M.D.	Winona
F. E. Harrington, M.D.	Minneapolis

---

*Terms expire December 31, of year indicated.

ECONOMIC COMMITTEES

COMMITTEE ON INDUSTRIAL RELATIONS*

J. M. Hayes, M.D. (1937)	Minneapolis
B. S. Adams, M.D. (1936)	Hibbing
S. H. Boyer, M.D. (1937)	Duluth
G. R. Dunn, M.D. (1935)	Minneapolis
W. N. Graves, M.D. (1936)	Duluth
E. M. Hammes, M.D. (1936)	Saint Paul
M. S. Henderson, M.D. (1937)	Rochester
Alfred Hoff, M.D. (1935)	Saint Paul
R. C. Hunt, M.D. (1936)	Fairmont
E. G. McKeown, M.D. (1935)	Pipestone
C. B. Wright, M.D. (1937)	Minneapolis
H. B. Zimmermann, M.D. (1936)	Saint Paul

COMMITTEE ON PUBLIC HEALTH EDUCATION

L. R. Critchfield, M.D., General Chairman	Saint Paul

Executive

L. R. Critchfield, M.D.	Saint Paul
B. J. Branton, M.D.	Willmar
Karl Dedolph, M.D.	Saint Paul
H. F. Helmholz, M.D.	Rochester
J. A. Myers, M.D.	Minneapolis
Horace Newhart, M.D.	Minneapolis
Martin Nordland, M.D.	Minneapolis
T. H. Sweetser, M.D.	Minneapolis

Liaison Editorial

J. S. Reynolds, M.D.	Minneapolis
L. R. Critchfield, M.D.	Saint Paul
Martin Nordland, M.D.	Minneapolis
C. L. Scofield, M.D.	Benson
T. H. Sweetser, M.D.	Minneapolis

Liaison Heart

F. J. Hirschboeck, M.D.	Duluth
V. I. Miller, M.D.	Mankato
A. A. Passer, M.D.	Olivia

Liaison State Health Relations

T. H. Sweetser, M.D.	Minneapolis
M. McC. Fischer, M.D.	Duluth
E. J. Tanquist, M.D.	Alexandria

Child Welfare

L. R. Critchfield, M.D.	Saint Paul
H. F. Helmholz, M.D.	Rochester
A. J. Henderson, M.D.	Kiester
A. B. Stewart, M.D.	Owatonna

Editorial

H. F. Helmholz, M.D.	Rochester
R. O. Beard, M.D.	Minneapolis
B. J. Branton, M.D.	Willmar
B. R. Karn, M.D.	Ortonville
J. A. Myers, M.D.	Minneapolis

Eye, Ear, Nose and Throat

C. J. Plonske, M.D.	Faribault
J. J. Gelz, M.D.	St. Cloud
C. L. Oppegaard, M.D.	Crookston

Liaison Public Health Nursing

E. S. Boleyn, M.D.	Stillwater
H. E. Binet, M.D.	Grand Rapids
C. L. Scofield, M.D.	Benson
A. B. Stewart, M.D.	Owatonna

Speakers' Bureau

F. H. Magney, M.D.	Duluth
Karl Dedolph, M.D.	Saint Paul
C. P. Robbins, M.D.	Winona

Tuberculosis

J. A. Myers, M.D.	Minneapolis
F. F. Callahan, M.D.	Pokegama
C. F. Ewing, M.D.	Wheaton

Liaison Cancer

Martin Nordland, M.D.	Minneapolis
C. W. Froats, M.D.	Thief River Falls
R. J. Hodapp, M.D.	Willmar
E. W. Johnson, M.D.	Bemidji
Herman Kesting, M.D.	Saint Paul

COMMITTEE ON PUBLIC POLICY AND LEGISLATION

H. M. Johnson, M.D.	Dawson
G. I. Badeaux, M.D.	Brainerd
L. A. Barney, M.D.	Duluth
E. A. Eberlin, M.D.	Glenwood
W. A. Fansler, M.D.	Minneapolis
J. M. Hayes, M.D.	Minneapolis
M. O. Oppegaard, M.D.	Crookston
F. J. Plondke, M.D.	Saint Paul
C. B. Wright, M.D.	Minneapolis

COMMITTEE ON STATE HEALTH RELATIONS

T. H. Sweetser, M.D.	Minneapolis
H. M. Blegen, M.D.	Warren
E. S. Boleyn, M.D.	Stillwater
L. R. Critchfield, M.D.	Saint Paul
C. L. Haney, M.D.	Duluth
C. M. Johnson, M.D.	Dawson
J. P. McDowell, M.D.	Saint Cloud
W. A. Piper, M.D.	Mountain Lake
H. R. Tregilgas, M.D.	South Saint Paul
R. V. Williams, M.D.	Rushford

EDITING AND PUBLISHING COMMITTEE*

J. T. Christison, M.D. (1939)	Saint Paul
A. S. Hamilton, M.D. (1935)	Minneapolis
E. M. Hammes, M.D. (1936)	Saint Paul
T. A. Peppard, M.D. (1937)	Minneapolis
Waltman Walters, M.D. (1938)	Rochester

EDITORIAL ASSOCIATION COMMITTEE

J. A. Watson, M.D.	Minneapolis
C. L. Scofield, M.D.	Benson
O. O. Larsen, M.D.	Detroit Lakes
J. A. Moga, M.D.	Saint Paul

COMMITTEE ON MEDICO-LEGAL AFFAIRS

W. H. Hengstler, M.D.	Saint Paul
B. J. Cronwell, M.D.	Austin
J. A. Johnson, M.D.	Minneapolis
A. G. Liedloff, M.D.	Mankato
F. H. Magney, M.D.	Duluth

RADIO COMMITTEE

S. R. Maxeiner, M.D.	Minneapolis
R. H. Frost, M.D.	Wabasha
H. H. Holm, M.D.	Glencoe
W. F. Maertz, M.D.	New Prague
W. L. Palmer, M.D.	Albert Lea
L. H. Rutledge, M.D.	Detroit Lakes
M. W. Smith, M.D.	Red Wing
F. P. Strathern, M.D.	Saint Peter
O. J. Swenson, M.D.	Waseca
Albert Thompson, M.D.	Saint James
G. B. Weiser, M.D.	New Ulm

COMMITTEE ON UNIVERSITY RELATIONS

F. J. Savage, M.D.	Saint Paul
M. S. Henderson, M.D.	Rochester
L. L. Sogge, M.D.	Windom
W. A. Coventry, M.D.	Duluth

COMMITTEE ON MEDICAL ECONOMICS

W. F. Braasch, M.D.	Rochester
B. J. Branton, M.D.	Willmar
A. N. Collins, M.D.	Duluth
J. C. Michael, M.D.	Minneapolis
J. A. Moga, M.D.	Saint Paul

Sub-Committees

Committee to Study Standards for Free Medical Service

Harry Oerting, M.D.	Saint Paul
B. F. Davis, M.D.	Duluth
L. R. Critchfield, M.D.	Saint Paul
F. J. Lexa, M.D.	Lonsdale
O. E. Locken, M.D.	Crookston
E. V. Strand, M.D.	Bayport
A. K. Stratte, M.D.	Pine City
T. H. Sweetser, M.D.	Minneapolis
A. O. Swenson, M.D.	Duluth

Committee to Study Limitation of Number of Physicians to be Licensed in Minnesota

N. O. Pearce, M.D.	Minneapolis
A. W. Adson, M.D.	Rochester
S. H. Boyer, M.D.	Duluth
C. B. Lewis, M.D.	Saint Cloud
H. W. Meyerding, M.D.	Rochester
R. E. Scammon, Ph.D., U. of M. (C.M.)	Minneapolis
Ivar Sivertsen, M.D.	Minneapolis

Committee to Study Contract Practice

S. Marx White	Minneapolis
A. C. Baker, M.D.	Fergus Falls
M. S. Henderson, M.D.	Rochester
J. C. Hultkrans, M.D.	Saint Paul
F. M. Manson, M.D.	Worthington
R. F. McGandy, M.D.	Minneapolis
H. R. Tregilgas, M.D.	South Saint Paul

---

*Terms expire December 31, of year indicated.

WOMEN'S AUXILIARY
TO THE
MINNESOTA STATE MEDICAL ASSOCIATION

OFFICERS

Mrs. Martin Nordland	*President*	Minneapolis
Mrs. F. J. Elias	*President-Elect*	Duluth
Mrs. E. M. Hammes	*First Vice President*	St. Paul
Mrs. A. C. Baker	*Second Vice President*	Fergus Falls
Mrs. A. H. Sanford	*Third Vice President*	Rochester
Mrs. B. R. Karn	*Recording Secretary*	Ortonville
Mrs. H. F. Wahlquist	*Corresponding Secretary*	Minneapolis
Mrs. J. F. Norman	*Treasurer*	Crookston
Mrs. Neil S. Dungay	*Auditor*	Northfield
Mrs. W. J. Byrnes	*Parliamentarian*	Minneapolis
Mrs. J. A. Thabes	*Historian*	Brainerd
Mrs. A. A. Passer	*Past President*	Olivia

CHAIRMEN OF COMMITTEES

Organizations—Mrs. F. J. Elias	Duluth
Finance—Mrs. S. S. Hesselgrave	St. Paul
Legislation—Mrs. J. O. McKeon	Montgomery
Public Relations—Mrs. E. A. Eberlin	Glenwood
Hygeia—Mrs. H. B. Bailey	Fairmont
Health Education—Mrs. A. M. Nicholson	Duluth
Editor—Mrs. C. F. Ewing	Wheaton
Press and Publicity—Mrs. W. B. Roberts	Minneapolis
Printing—Mrs. E. C. Eshelby	St. Paul
Resolutions—Mrs. R. J. Josewski	Stillwater
Social—Mrs. F. A. Erb	Minneapolis
Mrs. J. J. Ryan	St. Paul

COUNCILOR DISTRICTS

DISTRICT NO. 1

H. Z. Giffin, M.D. .... Rochester
Counties—Dodge, Fillmore, Freeborn, Goodhue, Houston, Mower Olmsted, Rice, Steele, Wabasha, Winona

DISTRICT NO. 2

L. L. Sogge, M.D. .... Windom
Counties—Cottonwood, Faribault, Jackson, Martin, Murray, Nobles, Pipestone, Rock, Watonwan

DISTRICT NO. 3

H. M. Workman, M.D. .... Tracy
Counties—Big Stone, Brown, Chippewa, Kandiyohi, Lac Qui Parle, Lincoln, Lyon, Meeker, Pope, Redwood, Stevens, Swift, Traverse, Yellow Medicine

DISTRICT NO. 4

J. S. Holbrook, M.D. .... Mankato
Counties—Blue Earth, Carver, LeSueur, McLeod, Nicollet, Renville, Scott, Sibley, Waseca

DISTRICT NO. 5

G. A. Earl, M.D. .... Saint Paul
Counties—Anoka, Chisago, Dakota, Isanti, Kanabec, Mille Lacs, Pine, Ramsey, Sherburne, Washington

DISTRICT NO. 6

J. M. Hayes, M.D. .... Minneapolis
Counties—Hennepin, Wright

DISTRICT NO. 7

W. W. Will, M.D. .... Bertha
Counties—Aitkin, Beltrami, Benton, Cass, Clearwater, Crow Wing, Hubbard, Morrison, Koochiching, Stearns, Todd, Wadena

DISTRICT NO. 8

W. L. Burnap, M.D. .... Fergus Falls
Counties—Becker, Clay, Douglas, Grant, Kittson, Lake of the Woods, Mahnomen, Marshall, Norman, Otter Tail, Pennington, Polk, Red Lake, Roseau, Wilkin

DISTRICT NO. 9

B. S. Adams, M.D. .... Hibbing
Counties—Carlton, Cook, Itasca, Lake, St. Louis

MINNESOTA STATE MEDICAL ASSOCIATION

COUNTY SOCIETY ROSTER

BLUE EARTH COUNTY MEDICAL SOCIETY

Regular meetings, last Monday of each month
Annual meeting, December
Number of Members: 30

President	
Sohmer, A. E.	Mankato
Secretary	
Koenigsberger, Charles	Mankato
Andrews, R. N.	Mankato
Benham, E. W.	Mankato
Black, William	Mankato
Butzer, J. A.	Mankato
Dahl, G. A.	Mankato
Denman, A. V.	Mankato
Edwards, R. T.	Elysian
Fugina, G. R.	Mankato
Franchere, F. W.	Lake Crystal
Haes, J. E.	Vernon Center
Hassett, R. G.	Mankato
Holbrook, J. S.	Mankato
Howard, M. I.	Mankato
Huffington, H. L.	Mankato
Juliar, R. O.	St. Clair
Koenigsberger, Charles	Mankato
Liedloff, A. G.	Mankato
Lloyd, H. J.	Mankato
Macbeth, J. L.	St. Clair
Miller, V. I.	Mankato
Osborn, Lida	Mankato
Samuelson, L. G.	Mankato
Schlesselman, J. T.	Mankato
Schmidt, P. A.	Good Thunder
Sohmer, A. E.	Mankato
Stillwell, W. C.	Mankato
Troost, H. B.	Mankato
Vezina, J. C.	Mapleton
Wentworth, A. J.	Mankato
Williams, H. O.	Lake Crystal

BLUE EARTH VALLEY MEDICAL SOCIETY

Faribault and Martin Counties
Regular meetings, First Thursday of February, May, August and November
Annual meeting, First Thursday in November
Number of Members: 34

President	
Sybilrud, S. W.	Bricelyn
Secretary	
Chambers, W. C.	Blue Earth
Bailey, H. B.	Fairmont
Barr, W. H.	Wells
Blanchard, H. G.	Fairmont
Boysen, Herbert	Welcome
Butz, J. A.	Triumph
Chambers, W. C.	Blue Earth
Cooper, M. D.	Winnebago
Demo, P. W.	Wells
Durgin, F. L.	Winnebago
Farrish, R. C.	Sherburn
Folta, John	Ceylon
Gardner, V. H.	Fairmont
Heimark, J. J.	Fairmont
Henderson, A. J.	Kiester
Holm, P. F.	Wells
Hunt, R. C.	Fairmont
Hunte, A. F.	Bylas, Arizona
Jacobs, A. C.	Elmore
Johnson, H. P.	Fairmont
Logan, F. W.	Blue Earth
Luedtke, G. H.	Fairmont
McGroarity, J. J.	Easton
Miller, H. A.	Fairmont
Mills, J. L.	Winnebago
Richardson, W. J.	Fairmont
Rowe, W. H.	Fairmont
Russ, H. H.	Blue Earth
Sommer, A. W.	Elmore
Sybilrud, H. W.	Bricelyn
Thayer, E. A.	Truman
Vaughan, V. M.	Truman
Wells, W. B.	Sherburn
Wilson, C. E.	Blue Earth
Zemke, E. E.	Fairmont

CAMP RELEASE DISTRICT MEDICAL SOCIETY

Chippewa, Lac Qui Parle, and Yellow Medicine Counties
Regular meetings, every two weeks in Fall and Spring
Annual meeting, November
Number of Members: 22

President	
Nelson, M. S.	Granite Falls
Secretary	
Westby, Nels	Madison
Bacon, R. S.	Montevideo
Bergh, L. N.	Montevideo
Burns, M. A.	Milan
Cress, E. E.	Boyd
Foshager, H. T.	Clara City
Hauge, M. I.	Clarkfield
Hauge, M. M.	Clarkfield
Herbert, W. L.	Maynard
Holmberg, L. J.	Canby
Johnson, C. M.	Dawson
Johnson, H. M.	Dawson
Jordan, L. S.	Granite Falls
Kilbride, J. S.	Canby
Lee, W. N.	Madison
Lima, Ludvig	Montevideo
Nelson, M. S.	Granite Falls
Olson, W. P.	Gaylord
Roust, H. A.	Montevideo
Smith, L. G.	Montevideo
Tangen, G. M.	Canby
Westhy, Magnus	Madison
Westby, Nels	Madison

CLAY-BECKER COUNTY MEDICAL SOCIETY

Regular meetings, June and December
Annual meeting, December
Number of Members: 22

President	
Larson, Arnold	Detroit Lakes
Secretary	
Jolin, R. V.	Lake Park
Aborn, W. H.	Hawley
Archibald, F. M.	Mahnomen
Bergheim, M. C.	Hawley
Bottolfson, B. T.	Moorhead
Carman, J. E.	Detroit Lakes
Duncan, J. W.	Moorhead
Ellingson, A. R.	Detroit Lakes
Flancher, L. H.	Lake Park
Gosslee, G. L.	Moorhead
Hagen, O. J.	Moorhead
Haight, G. G.	Audubon
Humphrey, E. W.	Moorhead
Ingebrigtson, E. K.	Moorhead
Jolin, R. V.	Lake Park
Larsen, O. O.	Detroit Lakes
Larson, Arnold	Detroit Lakes
Rutledge, L. H.	Detroit Lakes
Simison, C. W.	Hawley
Soine, T. S.	Barnesville
Stafne, W. A.	Rochester
Thysell, F. A.	Moorhead
Thysell, V. D.	Hawley

EAST CENTRAL MINNESOTA MEDICAL SOCIETY

Anoka, Chisago, Isanti, Kanabec, Mille Lacs, Pine and Sherburne Counties
Regular meetings, Quarterly
Annual meeting, November
Number of Members: 36

President	
Kelsey, C. G.	Hinckley
Secretary	
Norrgard, H. T.	Milaca
Arends, A. L.	Askov
Blumenthal, J. S.	Columbia Heights
Bossert, C. S.	Mora
Brown, R. W.	Cambridge
Brownstone, Manuel	Sandstone
Caley, G. R.	Princeton
Callahan, F. F.	Pokegama
Cooney, H. C.	Princeton
Dedolph, T. H.	Braham
Dredge, H. P.	Sandstone
Gates, C. E.	Anoka
Halpin, J. E.	Rush City
Hedenstrom, L. H.	Cambridge
Heseltine, V. G.	Taylors Falls
Holmes, A. E.	Rush City
Johnson, Carl E.	Cambridge
Kelsey, C. G.	Hinckley
Kling, F. L.	Milaca
Kooiker, H. J.	Milaca
McBroom, D. E.	Cambridge
Nethercott, E. G.	Pine City
Nordman, W. F.	Mora
Norrgard, H. T.	Milaca
Pearson, Bjarne	Taylors Falls
Peterson, A. A.	Mora
Phelps, A. G.	St. Paul
Roehlke, A. B.	Elk River
Schlesselman, George	Anoka
Spurzem, R. J.	Anoka
Stephen, E. L.	Hinckley
Stratte, A. K.	Pine City
Swensen, R. G.	Harris
Truog, C. P.	Lindstrom
Vik, Melvin	Onamia
Wahlberg, E. W.	Isle
Zeien, Thomas	North Branch

FREEBORN COUNTY MEDICAL SOCIETY

Regular meetings, Quarterly
Annual meeting, December
Number of Members: 19

President	
Kaasa, L. J.	Albert Lea
Secretary	
Gamble, P. M.	Albert Lea
Burns, H. D.	Albert Lea
Butturff, C. R.	Freeborn
Calhoun, F. W.	Albert Lea
Folken, F. G.	Albert Lea
Freeman, J. P.	Albert Lea
Freligh, W. P.	Albert Lea
Gamble, J. W.	Albert Lea
Gamble, P. M.	Albert Lea
Gullixon, A.	Albert Lea
Kaasa, L. J.	Albert Lea
Kamp, B. A.	Albert Lea
Leopard, B. A.	Albert Lea
Manley, L. V.	Albert Lea
Merrit, W. A.	Albert Lea
Palmer, C. F.	Albert Lea
Palmer, W. L.	Albert Lea
Schultz, J. A.	Albert Lea
Trombley, R. A.	Emmons
Whitson, S. A.	Alden

GOODHUE COUNTY MEDICAL SOCIETY

Regular meetings, none
Annual meeting, December
Number of Members: 19

President	
Vaaler, Thorwald	Cannon Falls
Secretary	
Steffens, L. A.	Red Wing
Aanes, A. M.	Red Wing
Anderson, S. H.	Red Wing
Brusegard, J. F.	Red Wing
Claydon, D. R.	Red Wing
Claydon, H. F.	Zumbrota
Claydon, L. E.	Red Wing
Cremer, P. H.	Hastings
Hedin, R. F.	Red Wing
Johnson, A. E.	Red Wing
Jones, A. W.	Red Wing
Juers, E. H.	Red Wing
Liffrig, W. W.	Goodhue
Mack, J. J.	Fordyce, Arkansas
McGuigan, H. T.	Red Wing
Miller, F. J.	Fort Snelling
Smith, M. W.	Red Wing
Steffens, L. A.	Red Wing
Vaaler, T.	Cannon Falls
Williams, M. R.	Cannon Falls

HENNEPIN COUNTY MEDICAL SOCIETY

Regular meetings, First Monday Each Month
Annual meeting, October
Number of Members: 556

President	
Hayes, J. M.	Minneapolis
Secretary	
Campbell, O. J.	Minneapolis
Ahrens, R. S.	Minneapolis
Alexander, H. A.	Minneapolis
Aling, C. A.	Minneapolis
Allen, H. W.	Minneapolis
Allison, R. G.	Minneapolis
Altnow, H. O.	Minneapolis
Andersen, A. G.	Minneapolis
Andersen, S. C.	Minneapolis
Anderson, D. D.	Minneapolis
Anderson, E. D.	Minneapolis
Anderson, E. R.	Minneapolis
Anderson, F. J.	Minneapolis
Anderson, J. K.	Minneapolis
Anderson, K. W.	Minneapolis
Anderson, P. A.	Minneapolis
Anderson, U. S.	Minneapolis
Andreassen, E. C.	Minneapolis
Annis, H. B.	Minneapolis
Arey, S. L.	Excelsior
Arlander, C. E.	Minneapolis
Arnold, D. C.	Minneapolis
Arvidson, C. G.	Minneapolis
Aune, Martin	Minneapolis
Aurand, W. H.	Minneapolis
Avery, J. F.	Minneapolis
Baken, M. P.	Minneapolis
Baker, A. T.	Minneapolis
Baker, E. L.	Minneapolis
Baker, Looe	Minneapolis
Barber, J. P.	Minneapolis
Barron, Moses	Minneapolis
Bass, G. W.	Minneapolis
Baxter, S. H.	Minneapolis
Bayard, H. F.	Minneapolis
Beard, A. H.	Minneapolis
Beard, R. O.	Minneapolis
Beckman, W. G.	Minneapolis
Bedford, E. W.	Minneapolis
Bell, E. T.	Minneapolis
Benjamin, A. E.	Minneapolis
Benjamin, E. G.	Minneapolis
Benn, F. G.	Minneapolis
Berger, A. G.	Minneapolis
Berkwitz, N. J.	Minneapolis
Bessesen, A. N., Jr.	Minneapolis
Bessesen, D. H.	Minneapolis
Bessesen, W. A.	Minneapolis
Blake, James	Hopkins
Bockman, M. W. H.	Minneapolis
Boies, L. R.	Minneapolis
Booth, A. E.	Minneapolis
Boreen, C. A.	Minneapolis
Borgeson, E. J.	Minneapolis
Bouman, H. A. H.	Minneapolis
Boynton, Ruth	Minneapolis
Bracken, H. M.	Claremont, Calif.
Bratrud, A. F.	Minneapolis
Brooks, C. N.	Minneapolis
Brown, E. D.	Minneapolis
Brown, E. J.	Minneapolis
Bryant, O. R.	Minneapolis
Bulkley, Kenneth	Minneapolis
Bullard, Mattie J.	Minneapolis
Butler, John	Minneapolis
Buzzelle, L. K.	Minneapolis
Cable, M. L.	Minneapolis
Cabot, G. S.	Minneapolis
Cabot, V. S.	Minneapolis
Cady, L. H.	Minneapolis
Callerstrom, G. W.	Minneapolis
Cameron, Isabell	Minneapolis
Camp, W. E.	Minneapolis
Campbell, L. M.	Minneapolis
Campbell, O. J.	Minneapolis
Cardle, A. E.	Minneapolis
Carey, J. B.	Minneapolis
Carlaw, C. M.	Minneapolis
Carlson, H. A.	Minneapolis
Caron, R. P.	Minneapolis
Cavanor, F. T.	Minneapolis
Cherry, C. H.	Minneapolis
Chesley, A. J.	Minneapolis
Christenson, C. R.	Minneapolis
Christianson, H. W.	Minneapolis
Clark, H. S.	Minneapolis
Cohen, S. S.	Oak Terrace
Condit, W. H.	Minneapolis
Cook, H. W.	Minneapolis
Cooperman, H. O.	Minneapolis
Corbett, J. F.	Minneapolis
Corniea, A. D.	Minneapolis
Cosman, E. O.	Minneapolis
Cottam, G. G.	Minneapolis
Crafts, L. M.	Minneapolis
Cranmer, R. R.	Minneapolis
Cranston, R. W.	St. Louis Park
Creevy, C. D.	Minneapolis
Curtin, J. F.	Minneapolis
Cutts, George	Minneapolis
Cutts, R. E.	Minneapolis
Dady, E. E.	Minneapolis
Dahl, E. O.	Minneapolis
Dahl, J. A.	Minneapolis
Daniel, D. H.	Minneapolis
Daniel, L. M.	Minneapolis
Dart, L. O.	Minneapolis
Davis, J. C.	Minneapolis
del Plaine, C. W.	Minneapolis
Devereaux, T. J.	Wayzata
Diehl, H. S.	Minneapolis
Diessner, H. D.	Minneapolis
Donaldson, C. A.	Mesa, Arizona
Dorge, R. I.	Minneapolis
Dornblaser, H. B.	Minneapolis
Dorsey, G. C.	Minneapolis
Doxey, G. L.	Minneapolis
Doyle, L. O.	Minneapolis
Drake, C. R.	Minneapolis
Drill, H. E.	Hopkins
Duff, E. R.	Minneapolis
Dumas, A. G.	Minneapolis
Dunlap, E. H.	Minneapolis
Dunn, G. R.	Minneapolis
Duryea, Marbry	Minneapolis
Duryea, W. M.	Minneapolis
Dutton, C. E.	Minneapolis
Dvorak, B. A.	Minneapolis
Dwan, P. F.	Minneapolis
Dworsky, S. D.	Minneapolis
Ehrenberg, C. J.	Minneapolis
Ehrlich, S. P.	Minneapolis
Eich, Matthew	Minneapolis
Eisenstadt, D. H.	Minneapolis
Eitel, G. D.	Minneapolis
Ellison, D. E.	Minneapolis
Engstrand, O. J.	Minneapolis
Erb, F. A.	Minneapolis
Erdmann, C. A.	Minneapolis
Erickson, R. F.	Minneapolis
Ericson, R. M.	Minneapolis
Evans, E. T.	Minneapolis
Evans, R. D.	Minneapolis
Exley, E. W. F.	Minneapolis
Fahr, G. E.	Minneapolis
Fansler, W. A.	Minneapolis
Fasbender, H. A.	Hastings
Feeney, J. M.	Minneapolis
Fenger, E. P. K.	Oak Terrace
Fetterly, Warren	Minneapolis
Fink, L. W.	Minneapolis
Fink, W. H.	Minneapolis
Fitzgerald, D. F.	Minneapolis
Fjeldstad, C. A.	Minneapolis
Ford, W. H.	Minneapolis
Foster, W. K.	Minneapolis
Fowler, L. H.	Minneapolis
Frary, Louise G.	Minneapolis
Fredericks, G. M.	Minneapolis
Friedell, Aaron	Minneapolis
Froehlich, H. W.	Minneapolis
Funk, V. K.	Oak Terrace
Gammell, J. H.	Minneapolis
Gardner, E. L.	Minneapolis
Giere, E. O.	Minneapolis
Giere, J. C.	Minneapolis
Giere, R. W.	Minneapolis
Giessler, P. W.	Minneapolis
Gilles, F. L.	Minneapolis
Gingold, B. A.	Minneapolis
Gratzek, F. R.	Minneapolis
Grave, Floyd	Minneapolis
Gray, R. C.	Minneapolis
Green, E. K.	Minneapolis
Greene, W. P.	Minneapolis
Greisheimer, Esther M.	Minneapolis
Grimes, Marian	Minneapolis
Gronvall, P. R.	Minneapolis
Gunderson, N. A.	Minneapolis
Gustason, H. T.	Minneapolis
Hacking, F. H.	Minneapolis
Hagen, G. L.	Minneapolis
Haggard, G. D.	Minneapolis
Hall, J. M.	Minneapolis
Hallberg, C. A.	Minneapolis
Hamel, A. L.	Minneapolis
Hamilton, A. S.	Minneapolis
Hamlin, G. B.	Minneapolis
Hand, R. O.	Minneapolis
Hannah, H. B.	Minneapolis
Hansen, E. W.	Minneapolis
Hansen, Olga S.	Minneapolis
Hanson, H. J.	Minneapolis
Hanson, H. V.	Minneapolis

Hanson, W. A.	Minneapolis
Harrington, C. D.	Minneapolis
Harrington, F. E.	Minneapolis
Harrison, W. C.	Minneapolis
Hart, V. L.	Minneapolis
Hartzell, T. B.	Minneapolis
Hastings, D. R.	Minneapolis
Haugen, J. A.	Minneapolis
Haverfield, Addie R.	Minneapolis
Hawkinson, R. P.	Robbinsdale
Hayes, J. M.	Minneapolis
Head, D. P.	Minneapolis
Head, G. D.	Minneapolis
Hedback, A. E.	Minneapolis
Helk, H. H.	Minneapolis
Hendrickson, J. F.	Minneapolis
Henrikson, E. C.	Minneapolis
Henry, C. E.	Minneapolis
Henry, M. O.	Minneapolis
Herbolsheimer, A. J.	Minneapolis
Herman, A. L.	Minneapolis
Hesdorffer, M. B.	Minneapolis
Hiebert, J. P.	Minneapolis
Higgins, J. H.	Minneapolis
Hill, Eleanor J.	Minneapolis
Hirschfelder, A. D.	Minneapolis
Hirshfield, F. R.	Minneapolis
Hoaglund, A. W.	Minneapolis
Hobbs, C. A.	Minneapolis
Hodge, S. V.	Minneapolis
Hoffert, H. E.	Minneapolis
Holl, P. M.	Minneapolis
Holt, W. B.	Minneapolis
Howard, W. H.	Minneapolis
Huenekens, E. J.	Minneapolis
Hughes, L. D.	Minneapolis
Hultkrans, R. E.	Minneapolis
Hurd, Annah	Minneapolis
Husband, M. W.	Minneapolis
Hutchinson, C. J.	Minneapolis
Hymes, Charles	Minneapolis
Hynes, J. E.	Minneapolis
Irvine, H. G.	Minneapolis
Irwin, A. F.	Minneapolis
Jackson, C. M.	Minneapolis
Jennings, F. L.	Oak Terrace
Jennings, Mary H.	Minneapolis
Jensen, Harry	Minneapolis
Jensen, M. J.	Minneapolis
Johnson, A. B.	Minneapolis
Johnson, A. E.	Minneapolis
Johnson, H. A.	Minneapolis
Johnson, J. A.	Minneapolis
Johnson, Julius	Minneapolis
Johnson, N. A.	Minneapolis
Johnson, Norman	Minneapolis
Johnson, R. A.	Minneapolis
Johnson, S. M.	Minneapolis
Johnson, Y. T.	Minneapolis
Johnston, L. F.	Minneapolis
Jones, G. M.	Minneapolis
Jones, H. W.	Minneapolis
Jones, W. R.	Minneapolis
Josewich, Alexander	Minneapolis
Kalin, O. T.	Minneapolis
Kelby, G. M.	Minneapolis
Kennedy, C. C.	Minneapolis
Kennedy, Jane F.	Minneapolis
Kennedy, R. R.	Minneapolis
Kertesz, G.	Minneapolis
Kibbe, O. A.	Minneapolis
King, E. A.	Minneapolis
King, H. T.	Minneapolis
Kinsella, T. J.	Oak Terrace
Kistler, A. J.	Minneapolis
Kistler, C. M.	Minneapolis
Knapp, M. E.	Minneapolis
Knight, R. R.	Minneapolis
Knight, R. T.	Minneapolis
Koepcke. G. M.	Minneapolis
Koller, H. M.	Minneapolis
Koller, L. R.	Minneapolis
Kucera, F. J.	Hopkins
Kucera, W. J.	Minneapolis
Lajoie, J. M.	Minneapolis
Lapierre, A. P.	Minneapolis
Lapierre, C. A.	Minneapolis
Lapierre, J. T.	Minneapolis
Larsen, F. W.	Minneapolis
Larson, C. M.	Minneapolis
Larson, L. M.	Minneapolis
Larson, P. N.	Minneapolis
Laurent, A. A.	Minneapolis
LaVake, R. T.	Minneapolis
Lazar, H. L.	Minneapolis
Leavitt, H. H.	Minneapolis
Lebowske. J. A.	Minneapolis
Lee, H. M.	Minneapolis
Leland. H. R.	Minneapolis
Lenz, O. A.	Minneapolis
Levine, N. M.	Minneapolis
Lillehei, E. J.	Robbinsdale
Lind, C. J.	Minneapolis
Lindquist, R. H.	Minneapolis
Linner, H. P.	Minneapolis
Linton, W. B.	Minneapolis
Lipschultz, Oscar	Minneapolis
Litman, A. B.	Minneapolis
Litzenberg, J. C.	Minneapolis
Logefeil, R. C.	Minneapolis
Long, Jesse	Minneapolis
Loomis, E. A.	Minneapolis
Lundblad, R. A.	Minneapolis
Lundgren, A. C.	Minneapolis
Lundquist, E. F.	Minneapolis
Lynch, M. J.	Minneapolis
Lyon, E. P.	Minneapolis
Lysne, Henry	Minneapolis
MacDonald, A. E.	Minneapolis
MacDonald, D. A.	Minneapolis
MacDonald. I. C.	Minneapolis
Mach, F. B.	Minneapolis
Macnie, J. S.	Minneapolis
Maland, C. O.	Minneapolis
*Mann, A. T.	Minneapolis
Marcley, W. J.	Minneapolis
Mariette, E. S.	Oak Terrace
Mark, D. B.	Minneapolis
Martinson, C. J.	Wayzata
Matchan, G. R.	Minneapolis
Matthews. Justus	Minneapolis
Mattill, P. M.	Oak Terrace
Mattson, Hamlin	Minneapolis
May, W. H.	Minneapolis
Maxeiner, S. R.	Minneapolis
McCarthy, Donald	Minneapolis
McCartney, J. S.	Minneapolis
McDaniel, Orianna	Minneapolis
*McEachran, A.	Minneapolis
McFarland. A. H.	Minneapolis
McGandy, R. F.	Minneapolis
McGeary, G. E.	Minneapolis
McInerney. Maurice	Minneapolis
McIntyre, George	Minneapolis
McKinlay, C. A.	Minneapolis
McKinley, J. C.	Minneapolis
McKinney, F. S.	Minneapolis
McPheeters, H. O.	Minneapolis
McQuarrie, Irvine	Minneapolis
Medelman. J. P.	Minneapolis
Mee, P. H.	Osseo
Meland, E. L.	Minneapolis
Merkert, C. E.	Minneapolis
Merkert, G. L.	Minneapolis
Merrill, Elisabeth	Minneapolis
Meyer, E. L.	Minneapolis
Michael, J. C.	Minneapolis
Michelson, H. E.	Minneapolis
Miller, H. E.	Minneapolis
Miller, J. C.	Minneapolis
Milton. J. S.	Minneapolis
Moe, J. H.	Minneapolis
Moir, W. W.	Minneapolis
Moorhead, M. B.	Minneapolis
Moren, Edward	Minneapolis
Moriarty, Cecile R.	Minneapolis
Morrison, A. W.	Minneapolis
Morse, R. W.	Minneapolis
Morton, H. McI.	Vincentown, N. J.
Murphy, I. J.	Minneapolis
Murphy. Leo	Minneapolis
Myers, J. A.	Minneapolis
Nathanson. M. H.	Minneapolis
Neal, J. M.	Minneapolis
Neilson, H. F.	Minneapolis
Nelson, H. S.	Minneapolis
Nelson, Harvey	Minneapolis
Nelson, O. E.	Minneapolis
Newhart. Horace	Minneapolis
Nordin, G. T.	Minneapolis
Nordland, Martin	Minneapolis
Noth, H. W.	Minneapolis
Nystrom. Ruth	Minneapolis
Oberg, C. M.	Minneapolis
O'Brien, W. A.	Minneapolis
O'Donnell. J. E.	Minneapolis
Olson, F. A.	Minneapolis
Olson, O. A.	Minneapolis
Olson, R. G.	Minneapolis
Oppen, E. G.	Minneapolis
Owre, Oscar	Minneapolis
Parks, A. H.	Minneapolis
Patterson. W. E.	Minneapolis
Paul. Louise Mary	Minneapolis
Paulsen, E. L.	Minneapolis
Pearce, N. O.	Minneapolis
*Pederson, Harold	Minneapolis
Pederson. R. M.	Minneapolis
Pennington, Reuben	Minneapolis
Peppard. T. A.	Minneapolis
Perry, R. St. J.	Minneapolis
Petersen, J. R.	Minneapolis
Petersen, Thorvald	Minneapolis
Peterson, H. W.	Minneapolis
Peterson, N. P.	Minneapolis
Peterson, O. H.	Minneapolis
Peterson, P. E.	Minneapolis
Peterson, W. C.	Minneapolis
Peterson, W. H.	Minneapolis
Petit, L. J.	Minneapolis
Petter, C. K.	Oak Terrace
Pettit, C. W.	Minneapolis
Peyton, W. T.	Minneapolis
Pfunder, M. C.	Minneapolis
Phelps, K. A.	Minneapolis
Platou, E. S.	Minneapolis
Pollard, D. W.	Minneapolis
Pollock, D. K.	Minneapolis
Polzak, J. A.	Minneapolis
Pratt, F. J.	Minneapolis
Pratt, J. A.	Minneapolis
Preine, I. A.	Minneapolis
Prim, J. A.	Minneapolis
Proshek, C. E.	Minneapolis
Quinby, T. F.	Minneapolis
Quist, H. W.	Minneapolis
Rasmussen, R. C.	St. Paul
Reed, C. A.	Minneapolis
Regnier, E. A.	Minneapolis
Reimann, H. A.	Minneapolis
Rice, C. O.	Minneapolis
Richardson, F. S.	Minneapolis
Richdorf, L. F.	Minneapolis
Rieke, W. W.	Wayzata
Rigler, L. G.	Minneapolis
Rishmiller, J. H.	Minneapolis
Rizer, R. I.	Minneapolis
Roan, C. M.	Minneapolis
Robb, E. F.	Minneapolis
Roberts, T. S.	Minneapolis
Roberts, W. B.	Minneapolis
Robitshek, E. C.	Minneapolis
Rochford, W. E.	Minneapolis
Rodda, F. C.	Minneapolis
Rodgers, C. L.	Minneapolis
Rosen, Samuel	Minneapolis
Rosenwald, R. M.	Minneapolis
Rucker, C. W.	Minneapolis
Rucker, W. H.	Minneapolis
Rud, N. E.	Minneapolis
Rudell, G. L.	Minneapolis
Rupp, Alice	Minneapolis
Russeth, A. N.	Minneapolis
Rusten, E. M.	Minneapolis
Sadler, W. P.	Minneapolis
St. Cyr, K. J.	Osseo
Salt, C. G.	Minneapolis
Samuelson, Samuel	Minneapolis
Sawatzky, W. A.	Minneapolis
Schaaf, F. H. K.	Minneapolis
Schaefer, W. G.	Minneapolis
Scheldrup, N. H.	Minneapolis
Schmitt, A. F.	Minneapolis
Schmitt, S. C.	Minneapolis
Schneider, J. P.	Minneapolis
Schottler, M. E.	Minneapolis
Schultz, P. J.	Minneapolis
Schussler, O. F.	Minneapolis
Schwartz, V. J.	Minneapolis
Schwyzer, Gustav	Minneapolis
Scott, F. H.	Minneapolis
Scott, H. G.	Minneapolis
Seashore, Gilbert	Minneapolis
Seham, Max	Minneapolis
Seifert, M. H.	Excelsior
Selleseth, I. F.	Minneapolis
Simons, J. H.	Minneapolis
Simpson, E. D.	Minneapolis
Siperstein, D. M.	Minneapolis
Sitar, R. F.	Minneapolis
Sivertsen, Ivar	Minneapolis
Skjold, A. C.	Minneapolis
Smith, A. E.	Minneapolis
Smith, A. M.	Minneapolis
Smith, H. R.	Minneapolis
Smith, N. M.	Minneapolis
Soderlind, R. T.	Minneapolis
Solhaug, S. B.	Minneapolis
Spano, J. P.	Minneapolis
Spratt, C. N.	Minneapolis
Stelter, L. A.	Minneapolis
Stenstrom. Annette T.	Minneapolis
Stewart, C. A.	Minneapolis
Stewart, R. I.	Minneapolis
Stomel, Joseph	Minneapolis
Strachauer, A. C.	Minneapolis
Strout, E. S.	Minneapolis
Strout, G. E.	Minneapolis
Sturre, J. R.	Minneapolis
Sundt, Mathias	Minneapolis
Swanson, Cephas	Minneapolis
Swanson, R. E.	Minneapolis
Sweetser, H. B., Jr.	Minneapolis
Sweetser, H. B., Sr.	Minneapolis
Sweetser, T. H.	Minneapolis
Sweitzer, S. E.	Minneapolis
Swendseen, C. G.	Minneapolis
*Tanner, A. C.	Minneapolis
Ternstrom. O. H.	Minneapolis
Thomas, G. E.	Minneapolis
Thomas, G. J.	Minneapolis
Trueman, H. S.	Minneapolis

Tunstead, H. J.	Minneapolis
Turnacliff, D. D.	Minneapolis
Tyrrell, C. C.	Minneapolis
Ude, W. H.	Minneapolis
Ulrich, H. L.	Minneapolis
Undine, C. A.	Minneapolis
Urner, J. A.	Minneapolis
Voyer, Emile O.	Minneapolis
Wahlquist, H. F.	Minneapolis
Waldron, C. W.	Minneapolis
Wall, C. R.	Minneapolis
Wangensteen, O. H.	Minneapolis
Wanous, E. Z.	Minneapolis
Ward, A. W.	Minneapolis
Ward, P. A.	Minneapolis
Warham, T. T.	Minneapolis
Watson, J. A.	Minneapolis
Webb, R. C.	Minneapolis
Weisman, S. A.	Minneapolis
Westman, R. T.	Minneapolis
Wethall, A. G.	Minneapolis
Wetherby, Macnider	Minneapolis
Weum, T. W.	Minneapolis
White, S. M.	Minneapolis
Widen, W. F.	Minneapolis
Wiese, H. F. B.	Minneapolis
Wilcox, A. E.	Minneapolis
Wilder, R. L.	Minneapolis
Wilken, P. A.	Minneapolis
Wilkerson, V. A.	Washington, D. C.
Willcutt, C. E.	Minneapolis
Williams, Robert	Minneapolis
Wilson, V. A.	Minneapolis
Winer, L. H.	Minneapolis
Winther, Nora M. C.	Minneapolis
Witham, C. A.	Minneapolis
Wittich, F. W.	Minneapolis
Wohlrabe, A. A.	Minneapolis
Wohlrabe, C. F.	Minneapolis
Wood, D. F.	Minneapolis
Woodworth, Elizabeth	Minneapolis
Wright, C. B.	Minneapolis
Wright, C. D.	Minneapolis
Wright, F. R.	Minneapolis
Wyatt, O. S.	Minneapolis
Wynne, H. M. N.	Minneapolis
Ylvisaker, R. S.	Minneapolis
Yoerg, O. W.	Minneapolis
Zaworski, E. A.	Minneapolis
Zierold, A. A.	Minneapolis
Ziskin, Thomas	Minneapolis

KANDIYOHI-SWIFT-MEEKER COUNTY MEDICAL SOCIETY

Regular meetings, Second Thursday of Month
Annual meeting, December
Number of Members: 31

President
Behmler, F. W. .... Appleton

Secretary
Scofield, C. L. .... Benson

Anderson, R. E.	Willmar
Arnson, J. M.	Benson
Behmler, F. W.	Appleton
Branton, A. F.	Willmar
Branton, B. J.	Willmar
Brigham, Frank	Watkins
Daignault, Oscar	Benson
Danielson, K. A.	Litchfield
Danielson, Lennox	Litchfield
Dowswell, W. J.	Kerkhoven
Dulude, S. S.	Dassel
Edwards, G. C.	Grove City
Fiksdal, M. J.	Willmar
Fredrickson, Alice C.	Lake Lillian
Fredrickson, G. U. Y.	Lake Lillian
Frisch, F. P.	Willmar
Frost, E. H.	Willmar
Giere, S. W.	Benson
Hodapp, R. J.	Willmar
Hutchinson, Henry	Willmar
Jacobs, J. C.	Willmar
Jensen, H. H.	Atwater
Johnson, Hans	Kerkhoven
Kaufman, W. C.	Appleton
Macklin, W. E., Jr.	Litchfield
O'Connor, D. C.	Eden Valley
Rains, J. M.	Willmar
Ripple, R. J.	New London
Scofield, C. L.	Benson
Telford, V. J.	Litchfield
Wilmot, H. E.	Litchfield

LYON-LINCOLN COUNTY MEDICAL SOCIETY

Regular meetings, First Tuesday of Month
Annual meeting, October
Number of Members: 22

President
Happe, L. J. .... Marshall

Secretary
Workman, H. M. .... Tracy

Akester, Ward	Marshall
Bossingham, O. N.	Lake Benton
Ford, B. C.	Marshall
Germo, Charles	Balaton
Golden, C. M.	Tyler
Gray, F. D.	Marshall
Happe, L. J.	Marshall
Hermanson, P. E.	Hendricks
Hoidale, A. D.	Tracy
Jacquot, G. L.	Marshall
Monson, L. J.	Hendricks
Nilson, H. J.	North Mankato
Persons, C. E.	Marshall
Purves, G. H.	Russell
Robertson, J. B.	Cottonwood
Sanderson, E. T.	Minneota
Thordarson, Theodore	Minneota
Vadheim, A. L.	Tyler
Valentine, W. H.	Tracy
Workman, H. M.	Tracy
Workman, W. G.	Tracy
Yaeger, W. W.	Ivanhoe

McLEOD COUNTY MEDICAL SOCIETY

Regular meetings, Quarterly or at call of President
Annual meeting, January or February
Number of Members: 18

President
Lippmann, E. W. .... Hutchinson

Secretary
Fine, B. A. .... Winsted

Clement, J. B.	Lester Prairie
Crow, E. R.	Arlington
Fine, B. A.	Winsted
Holm, H. H.	Glencoe
Jensen, A. H.	Hutchinson
Klima, W. W.	Stewart
Langhoff, A. H.	Glencoe
Lippmann, E. W.	Hutchinson
McMahon, M. J.	Green Isle
Ninneman, N. N.	Silver Lake
Rempel, D. D.	Brownton
Sahr, W. G.	Hutchinson
Schmidt, W. R.	Glencoe
Scholpp, O. W.	Hutchinson
Sheppard, Fred	Hutchinson
Sheppard, P. E.	Hutchinson
Tinker, C. W.	Stewart
Trutna, T. J.	Silver Lake

MOWER COUNTY MEDICAL SOCIETY

Regular meetings, last Thursday each Month, except June, July and August
Annual meeting, last Thursday in November
Number of Members: 23

President
Hegge, O. H. .... Austin

Secretary
Robertson, P. A. .... Austin

Allen, A. W.	Austin
Allen, C. C.	Austin
Cronwell, B. J.	Austin
Flanagan, L. G.	Austin
Greene, H. H.	Austin
Grise, W. B.	Austin
Havens, J. G. W.	Austin
Hegge, O. H.	Austin
Hegge, R. S.	Austin
Henslin, A. E.	Le Roy
Hertel, G. E.	Austin
Leck, P. C.	Austin
Lommen, P. A.	Austin
McKenna, J. K.	Austin
Melzer, G. R.	Lyle
Mitchell, R. S.	Grand Meadow
Morrow, J. J.	Austin
Morse, M. P.	LeRoy
Rebman, E. C.	Austin
Robertson, P. A.	Austin
Schottler, G. J.	Dexter
Sheedy, C. L.	Austin
Thomson, J. M.	Brownsdale

NICOLLET-LE SUEUR COUNTY MEDICAL SOCIETY

Regular meetings, January, April, Summer, October
Annual meeting, January
Number of Members: 17

President
Wolner, O. H. .... St. Peter

Secretary
Ericson, Swan .... Le Sueur

Aitkens, H. B.	Le Center
Covell, W. W.	St. Peter
Curtis, R. A.	Le Center
Ericson, Swan	Le Sueur
Freeman, G. H.	St. Peter
Gully, R. J.	St. Peter
Hiniker, P. J.	Le Sueur
Holtan, Theodore	Waterville
Kerschbaumer, Louisa	St. Peter
Kolars, J. J.	Le Center
Lenander, M. E.	St. Peter
McKeon, J. O.	Montgomery
Petersen, M. C.	St. Peter
Sonnesyn, N. N.	Le Sueur
Strathern, F. P.	St. Peter
Traxler, F. J.	Henderson
Wolner, O. H.	St. Peter

OLMSTED-HOUSTON-FILLMORE-DODGE COUNTY MEDICAL SOCIETY

Regular meetings, First Wednesday Every Odd Month
Annual meeting, First Wednesday in November
Number of Members: 289

President	
Snell, A. M.	Rochester
Secretary	
Piper, M. C.	Rochester
Adson, A. W.	Rochester
Affeldt, D. E.	Kasson
Albers, E. C.	Champaign, Ill.
Allen, E. V.	Rochester
Alvarez, W. C.	Rochester
Amberg, Samuel	Rochester
Anderson, C. M.	Rochester
Anderson, C. R.	Rochester
Anderson, M. J.	Rochester
Anderson, N. E.	Harmony
Bailey, R. J.	Rochester
Baker, C. P.	Rochester
Baker, H. R.	Hayfield
Baker, T. W.	Rochester
Bair, H. L.	Rochester
Balfour, D. C.	Rochester
Bannick, E. G.	Rochester
Bargen, J. A.	Rochester
Barker, N. W.	Rochester
Barnes, A. R.	Rochester
Beaver, D. C.	Rochester
Bedard, R. E.	Rochester
Beiswanger, R. H.	Wykoff
Belote, G. B.	Caledonia
Benedict, W. L.	Rochester
Berkman, D. M.	Rochester
Berkman, J. M.	Rochester
Betlach, C. J.	Rochester
Bigelow, C. E.	Dodge Center
Binger, M. W.	Rochester
Blake, T. W.	Rochester
Blum, B. B.	Rochester
Boothby, W. M.	Rochester
Bowing, H. H.	Rochester
Braasch, W. F.	Rochester
Brink, J. R.	Rochester
Broders, A. C.	Rochester
Brown, A. E.	Rochester
Brown, G. E.	Rochester
Brown, P. W.	Rochester
Brunsting, L. A.	Rochester
Brust, J. C. M.	Syracuse, N. Y.
Buchtel, H. A.	Rochester
Buie, L. A.	Rochester
Burch, H. A.	Rochester
Butsch, W. L.	Rochester
Butt, H. R.	Rochester
Cabot, C. M.	Rochester
Cabot, Hugh	Rochester
Camp, J. D.	Rochester
Canfield, W. W.	Houston
Carlson, L. A.	Rochester
Carow, T. M.	Rochester
Clark, L. W.	Spring Valley
Coate, J. D.	Rochester
Coffey, R. J.	Rochester
Collins, D. C.	Los Angeles, Calif.
Comfort, M. W.	Rochester
Conner, H. M.	Rochester
Cook, E. N.	Rochester
Costello, R. T.	Rochester
Counseller, V. S.	Rochester
Cragg, R. W.	Rochester
Craig, W. McK.	Rochester
Crenshaw, J. L.	Rochester
Crewe, J. E.	Rochester
Curry, F. S.	Detroit, Mich.
Davenport, L. H.	Rochester
Davis, A. C.	Rochester
Davis, I. G.	Rushford
Davis, P. L.	Rochester
Deacon, A. E.	Rochester
Deissler, K. J.	Oakland, Calif.
Desjardins, A. U.	Rochester
Dixon, C. F.	Rochester
Dolder, F. C.	Eyota
Dorsey, J. M.	Rochester
Drake, F. A.	Lanesboro
Drips, Della G.	Rochester
Dry, T. J.	Rochester
Eaton, L. McK.	Rochester
Edward, George	Canton
Emmett, J. L.	Rochester
Eusterman, G. B.	Rochester
Evarts, A. B.	Rochester
Faber, J. E.	Rochester
Fatherree, T. J., Jr.	Rochester
Fawcett, C. E.	Stewartville
Figi, F. A.	Rochester
Fisher, Laura M.	Rochester
Foley, M. P.	Rochester
Foster, F. P.	Rochester
Foster, R. F.	Rochester
Fricke, R. E.	Rochester
Gaarde, F. W.	Rochester
Garling, L. C.	Rochester
Ghormley, R. K.	Rochester
Giffin, H. Z.	Rochester
Gillespie, D. L.	Rochester
Gilpin, S. F., Jr.	Rochester
Goldsmith, Grace A.	Rochester
Goodwin, T. W.	Rochester
Gray, H. K.	Rochester
Griffin, A. M.	Rochester
Guthrie, J. S.	Rochester
Habein, H. C.	Rochester
Haines, S. F.	Rochester
Hale, D. E.	Rochester
Hallenbeck, D. F.	Rochester
Hamilton, W. S.	Cincinnati, Ohio
Hardwick, R. S.	Rochester
Harrington, S. W.	Rochester
Hartman, H. R.	Rochester
Havens, F. Z.	Rochester
Hebert, W. H. J.	Rochester
Heck, F. J.	Rochester
Heilman, F. R.	Rochester
Helland, G. M.	Spring Grove
Helland, J. W.	Spring Grove
Helmholz, H. F.	Rochester
Hempstead, B. E.	Rochester
Hench, P. S.	Rochester
Henderson, M. S.	Rochester
Herrell, W. E.	Rochester
Hertzog, A. J.	Rochester
Hewitt, Edith S.	Rochester
Hewitt, R. M.	Rochester
Heyerdale, O. C.	Rochester
Hines, E. A., Jr.	Rochester
Hinshaw, H. C.	Rochester
Hoerner, M. T.	Rochester
Horton, B. T.	Rochester
Howell, L. P.	Rochester
Hubly, J. W.	Rochester
Hunt, A. B.	Rochester
Johnson, R. B.	Lanesboro
Jones, H. M.	Rochester
Joyce, G. T.	Rochester
Judd, E. S.	Rochester
Keith, N. M.	Rochester
Kennedy, R. L. J.	Rochester
Kepler, E. J.	Rochester
Kernohan, J. W.	Rochester
Kirklin, B. R.	Rochester
Kirklin, O. L.	Rochester
Knepper, P. A.	Rochester
Koelsche, G. A.	Rochester
Kroeze, R. G.	Rochester
Kvale, W. F.	Rochester
Lannin, J. C.	Mabel
Leddy, E. T.	Rochester
Lemon, W. S.	Rochester
Lendrum, F. C.	Madison, Wis.
Lenton, H. P.	Rochester
Leser, R. U.	Rochester
Lillie, H. I.	Rochester
Lochead, D. C.	Rochester
Logan, A. H.	Rochester
Love, J. G.	Rochester
Luden, Georgine	Victoria, B. C., Can.
Lundy, J. S.	Rochester
Macey, H. B.	Rochester
Magath, T. B.	Rochester
Magee, H. R.	Los Angeles, Calif.
Magiera, Estelle A.	Rochester
Maisel, J. J.	New York, N. Y.
Malerich, J. A.	Caledonia
Mann, F. C.	Rochester
Marble, W. P.	Rochester
Masson, D. M.	Rochester
Masson, J. C.	Rochester
Mayo, C. H.	Rochester
Mayo, C. W.	Rochester
Mayo, J. G.	Rochester
Mayo, W. J.	Rochester
Maytum, C. K.	Rochester
McCarty, W. C.	Rochester
McCormack, C. J.	Rochester
McDonald, J. R.	Rochester
McGowan, J. M.	Rochester
McKaig, C. B.	Pine Island
McKechnie, R. E.	Rochester
McTamaney, R. A.	Rochester
Meyerding, H. W.	Rochester
Mills, J. H.	Rochester
Moersch, F. P.	Rochester
Moersch, H. J.	Rochester
Montgomery, Hamilton	Rochester
Mussey, R. D.	Rochester
Nass, H. A.	Mabel
Nehring, J. P.	Preston
Nettrour, W. S.	Rochester
New, G. B.	Rochester
Ochsner, H. C.	Rochester
Odel, H. M.	Rochester
O'Leary, P. A.	Rochester
Olson, E. A.	Pine Island
Olson, G. E.	West Concord
Olson, P. F.	Rochester
O'Neal, B. L.	Rochester
Onsgard, L. K., Jr.	Houston
Onsgard, L. K., Sr.	Houston
Overton, L. M.	Rochester
Pace, J. McI.	Rochester
Parker, R. L.	Rochester
Parkhill, Edith M.	Rochester
Pemberton, J. deJ.	Rochester
Peterson, D. L.	Rochester
Pilcher, Frederick, Jr.	Rochester
Piper, M. C.	Rochester
Plummer, H. S.	Rochester
Plummer, W. A.	Rochester
Pollock, L. W.	Rochester
Popp, W. C.	Rochester
Porter, G. L.	Rochester
Prangen, A. D.	Rochester
Prickman, L. E.	Rochester
Priestley, J. T.	Rochester
Raaf, J. E.	Rochester
Randall, L. M.	Rochester
Rivers, A. B.	Rochester
Robertson, H. E.	Rochester
Robins, C. R., Jr.	Richmond, Va.
Robinson, L. W.	Denver, Colo.
Robinson, V. C.	Rochester
Rosenow, E. C.	Rochester
Rynearson, E. H.	Rochester
Sanford, A. H.	Rochester
Sanford, H. S.	Rochester
Saunders, T. S., Jr.	Rochester
Scherer, R. G.	Dubuque, Iowa
Schmidt, H. W.	Rochester
Schulhof, M. G.	Rochester
Sheldon, W. D.	Rochester
Shoemaker, Rosemary	Rochester
Slavens, J. J.	Toronto, Canada
Slocumb, C. H.	Rochester
Smith, B. F.	Rochester
Smith, F. D.	Kasson
Smith, F. L.	Rochester
Smith, H. L.	Rochester
Smith, N. D.	Rochester
Snell, A. M.	Rochester
Stacy, L. J.	Rochester
Stalker, L. K.	Rochester
Steenrod, E. J.	Rochester
Steven, George	Byron
Stevens, G. A. W.	Rochester
Strohl, E. L.	Rochester
Stuart, H. A.	Rochester
Stuhler, L. G.	Rochester
Sullivan, R. R.	Rochester
Sutherland, C. G.	Rochester
Sutton, L. F.	Mazeppa
Teall, R. C.	Rochester
Teem, M. Van B.	Rochester
Thiessen, N. W.	Rochester
Thompson, G. J.	Rochester
Tierney, C. M.	Harmony
Tovell, R. M.	Rochester
Tuohy, E. B.	Rochester
Turnbull, A.	Rochester
Vinson, P. P.	Rochester
Wagener, H. P.	Rochester
Waldron, G. W.	Fort Peck, Montana
Walters, Waltman	Rochester
Ward, C. E.	Rochester
Watkins, C. H.	Rochester
Waugh, J. M.	Rochester
Weber, H. M.	Rochester
Weir, J. F.	Rochester
Welch, C. S.	Rochester
Wellbrock, W. L. A.	Rochester
Welsh, A. L.	Rochester
Wesson, H. R.	Rochester
Wherry, F. P., Jr.	Rochester
Whittaker, L. D.	Rochester
Wilbur, D. L.	Rochester
Wilder, R. M.	Rochester
Williams, H. L., Jr.	Rochester
Williams, R. V.	Rushford
Willius, F. A.	Rochester
Wilson, L. B.	Rochester
Woltman, H. W.	Rochester
Wood, H. G.	Rochester
Woodruff, C. W.	Chatfield
Youngerman, W. M.	Rochester
Zellhoefer, H. W. K.	Rochester
Zide, H. A.	Rochester

PARK REGION DISTRICT AND COUNTY MEDICAL SOCIETY

Douglas, Grant, Otter Tail and Wilkin Counties
Regular meetings, Second Wednesday Every Even Month
Annual meeting, October
Number of Members: 48

President

Tanquist, E. J.	Alexandria

Secretary

Baker, N. H.	Fergus Falls

Baker, A. C.	Fergus Falls
Baker, N. H.	Fergus Falls
Blakey, A. R.	Osakis
Boline, C. A.	Battle Lake
Boyd, L. M.	Alexandria
Boysen, Peter	Pelican Rapids
Broker, W. S.	Battle Lake
Burnap, W. L.	Fergus Falls
Clifford, G. W.	Osakis
Combacker, L. C.	Fergus Falls
Drought, W. W.	Fergus Falls
Esser, John	Perham
Estrem, C. O.	Fergus Falls
Hand, W. R.	Elbow Lake
Hanson, E. C.	New York Mills
Haskell, A. D.	Alexandria
Heiberg, E. A.	Fergus Falls
Hodgson, C. H.	Fergus Falls
Jacobs, G. C.	Fergus Falls
Johnson, O. V.	Fergus Falls
Kemp, M. W.	Fergus Falls
Kierland, P. E.	Alexandria
Lee, W. A.	Fergus Falls
Leibold, H. H.	Parkers Prairie
Lewis, A. J.	Henning
Love, F. A.	Carlos
Lund, C. J. T.	Underwood
Meckstroth, C. W.	Brandon
Miller, W. A.	New York Mills
Naegeli, Frank	Fergus Falls
Nelson, W. I.	Minneapolis
Otto, H. C.	Frazee
Parson, L. R.	Elbow Lake
Parson, E. Lillian B.	Elbow Lake
Patterson, W. L.	Fergus Falls
Paulson, T. S.	Fergus Falls
Powers, F. W.	Barrett
Reeve, E. T.	Elbow Lake
Rimer, E. W.	Breckenridge
Satersmoen, Theodore	Pelican Rapids
Sather, E. R.	Alexandria
Serkland, J. C.	Rothsay
Stafford, C. E.	Dent
Steube, R. W.	Alexandria
Tanquist, E. J.	Alexandria
Vail, J. B.	Henning
Windsor, R. L.	Rothsay
Wray, W. E.	Campbell

RAMSEY COUNTY MEDICAL SOCIETY

Regular meetings, Last Monday in every month excepting June, July, August
Annual meeting, last Monday in January
Number of Members: 320

President

Burns, R. M.	St. Paul

Secretary

Hultkrans, J. C.	St. Paul

Abbott, J. S.	St. Paul
Ahrens, A. E.	St. Paul
Ahrens, A. H.	St. Paul
Alberts, M. W.	St. Paul
Alden, J. F.	St. Paul
Alexander, F. H.	St. Paul
Armstrong, J. M.	St. Paul
Arnquist, A. S.	St. Paul
Aurelius, J. R.	St. Paul
Ausman, C. F.	St. Paul
Backus, A. S.	St. Paul
Bacon, D. K.	St. Paul
Bacon, L. C.	St. Paul
Balcome, M. M.	St. Paul
Barry, L. W.	St. Paul
Barsness, Nellie	St. Paul
Beadie, W. D.	Cannon Falls
Beals, Hugh	St. Paul
Bell, C. C.	St. Paul
Benepe, J. L.	St. Paul
Bennion, P. H.	St. Paul
Bentley, N. P.	St. Paul
Berrisford, P. D.	St. Paul
Bicek, J. F.	St. Paul
Binger, H. E.	St. Paul
Birnberg, T. L.	St. Paul
Bock, R. A.	St. Paul
Boeckmann, Egil	St. Paul
Bohland, E. H.	St. Paul
Bolender, H. L.	St. Paul
Borg, J. F.	St. Paul
Bouma, L. R.	St. Paul
Brand, G. D.	St. Paul
Bray, E. R.	St. Paul
Briggs, J. F.	St. Paul
Brodie, W. D.	St. Paul
Brown, E. I.	St. Paul
Brown, J. C.	St. Paul
Burch, F. E.	St. Paul
Burfield, G. H.	St. Paul
Burns, R. M.	St. Paul
Burton, C. G.	St. Paul
Busher, H. H.	St. Paul
Caldwell, J. P.	St. Paul
Campbell, J. E.	So. St. Paul
Carroll, W. C.	St. Paul
Carter, F. G.	St. Paul
Chatterton, C. C.	St. Paul
Christiansen, A.	St. Paul
Christison, J. T.	St. Paul
Clark, T. C.	Minneapolis
Colby, Woodard	St. Paul
Cole, W. H.	St. Paul
Collie, H. G.	St. Paul
Colvin, A. R.	St. Paul
Connor, C. E.	St. Paul
Countryman, R. S.	St. Paul
Cowern, E. W.	North St. Paul
Critchfield, L. R.	St. Paul
Culligan, J. M.	St. Paul
Dack, L. G.	St. Paul
Darling, J. B.	St. Paul
Daugherty, E. B.	St. Paul
Daugherty, L. E.	St. Paul
Davis, Herbert	St. Paul
Davis, William	St. Paul
Dedolph, Karl	St. Paul
Derauf, B. I.	St. Paul
Dickson, T. H., Jr.	St. Paul
Dittman, G. C.	St. Paul
Donohue, P. F.	St. Paul
Dovre, C. M.	St. Paul
Drake, C. B.	St. Paul
Dunn, J. N.	St. Paul
Earl, G. A.	St. Paul
Earl, R. O.	St. Paul
Edlund, G.	St. Paul
Ely, O. S.	So. St. Paul
Emerson, E. C.	St. Paul
Endress, E. K.	St. Paul
Engberg, E. J.	St. Paul
Ernest, G. C.	St. Paul
Eshelby, E. C.	St. Paul
Fahey, E. W.	St. Paul
Ferguson, J. C.	St. Paul
Fesler, H. H.	St. Paul
Flanagan, H. F.	St. Paul
Fogarty, C. W.	St. Paul
Fogelberg, E. J.	St. Paul
Foley, F. E. B.	St. Paul
Freeman, C. D.	St. Paul
Gager, E. C.	St. Paul
Garbrecht, Arthur	St. Paul
Gardiner, D. G.	St. Paul
Gardner, W. P.	Hastings
Geer, E. K.	St. Paul
Gehlen, J. N.	St. Paul
Geist, G. A.	St. Paul
Ghent, C. H.	St. Paul
Ghent, M. M.	St. Paul
Gilfillan, J. S.	St. Paul
Ginsberg, S. T.	St. Paul
Ginsberg, William	St. Paul
Goltz, E. V.	St. Paul
Grant, H. W.	St. Paul
Gratzek, Thomas	St. Paul
Gruenhagen, A. P.	St. Paul
Hagaman, G. K.	St. Paul
Hall, A. R.	St. Paul
Hall, H. H.	St. Paul
Hammes, E. M.	St. Paul
Hammond, J. F.	St. Paul
Harmon, G. E.	St. Paul
Hartfiel, W. F.	St. Paul
Hartley, E. C.	St. Paul
Hauser, V. P.	St. Paul
Hawkins, V. J.	St. Paul
Heath, A. C.	Stillwater
Heck, W. W.	St. Paul
Hedenstrom, F. G.	St. Paul
Hengstler, W. H.	St. Paul
Hensel, C. N.	St. Paul
Herrmann, E. T.	St. Paul
Heron, R. C.	St. Paul
Hesselgrave, S. S.	St. Paul
Hilger, A. W.	St. Paul
Hilger, D. D.	St. Paul
Hilger, L. A.	St. Paul
Hiniker, L. P.	St. Paul
Hochfilzer, J. J.	St. Paul
Hoff, Alfred	St. Paul
Hoffman, M. H.	St. Paul
Holcomb, J. T.	St. Paul
Holcomb, O. W.	St. Paul
Holmen, R. W.	St. Paul
Holt, J. E.	St. Paul
Howard, M. A.	St. Paul
Howard, W. S.	St. Paul
Hullsiek, R. B.	St. Paul
Hultkrans, J. C.	St. Paul
Ide, A. W.	St. Paul
Ikeda, Kano	St. Paul
Johanson, W. G.	St. Paul
Johnson, A. M.	St. Paul
Johnson, J. A.	St. Paul
Johnson, R. G.	St. Paul
Johnson, T. H.	San Francisco, Calif.
Jones, D. C.	St. Paul
Jones, E. M.	St. Paul
Kadesky, David	San Francisco, Calif.
Kamman, G. R.	St. Paul
Kannary, E. L.	St. Paul
Kaplan, D. H.	St. Paul
Kasper, E. M.	St. Paul
Kelly, J. V.	St. Paul
Kelly, P. H.	St. Paul
Kenefick, E. V.	St. Paul
Kennedy, W. A.	St. Paul
Kesting, Herman	St. Paul
King, G. L.	St. Paul
King, Z. P.	St. Paul
Klein, H. N.	St. Paul
Knauff, M. K.	St. Paul
Kugler, A. A.	St. Paul
Kvitrud, Gilbert	St. Paul
Langenderfer, F. V.	St. Paul
Larsen, C. L.	St. Paul
Lax, M. H.	St. Paul
Leahy, Bartholomew	St. Paul
Leavenworth, R. O.	St. Paul
Leitch, Archibald	St. Paul
Leonard, G. J.	St. Paul
Lepak, J. A.	St. Paul
Lerche, William	Cable, Wis.
Leven, N. L.	St. Paul
Levin, Bert	St. Paul
Lewis, W. W.	St. Paul
Lick, C. L.	St. Paul
Lippman, H. S.	St. Paul
Little, W. J.	St. Paul
Livingstone, J. W.	Hudson
Lowe, E. R.	So. St. Paul
Lowe, T. A.	So. St. Paul
Lundholm, A. M.	St. Paul
Lynch, F. W.	St. Paul
Madden, J. F.	St. Paul
Markoe, J. C.	St. Paul
Martineau, J. L.	St. Paul
Mattson, C. H.	St. Paul
McCarthy, J. J.	St. Paul
McCarthy, W. R.	St. Paul
McClanahan, J. H.	White Bear
McClanahan, T. S.	White Bear
McCloud, C. N.	St. Paul
McKeon, Owen	St. Paul
McLaren, J. M.	St. Paul
McNevin, C. F.	St. Paul
Meade, J. R.	St. Paul
Mears, B. J.	St. Paul
Meyerding, E. A.	St. Paul
Miller, E. W.	St. Paul
Moga, J. A.	St. Paul
Mogilner, S. N.	St. Paul
Molander, H. A.	St. Paul
Moquin, M. A.	St. Paul
Moran, T. R.	St. Paul
Moriarty, Berenice	St. Paul
Morrissey, F. B.	St. Paul
Mortenson, N. G.	St. Paul

Moss, M. N..................St. Paul
Moynihan, T. J...............St. Paul
Muller, R. T..................St. Paul
Myers, Thomas...............St. Paul
Naegeli, A. E.................St. Paul
Neher, F. H...................St. Paul
Nelson, L. A..................St. Paul
Nichols, A. E.................St. Paul
Nippert, H. T.................St. Paul
Noble, J. F....................St. Paul
Nordin, C. G..................St. Paul
Nye, Katherine A.............St. Paul
Nye, Lillian L.........Cortland, N. Y.
O'Connor, L. J...............St. Paul
Oerting, Harry...............St. Paul
Ogden, Warner...............St. Paul
Ohage, Justus................St. Paul
Ohage, Justus, Jr............St. Paul
Olson, C. A....................St. Paul
O'Reilley, B. E................St. Paul
Ostergren, E. W..............St. Paul
Ouelette, A. J.................St. Paul
Page, C. V.....................St. Paul
Pearson, F. R..................St. Paul
Pedersen, A. H................St. Paul
Perry, C. G.....................St. Paul
Peterson, D. B.................St. Paul
Peterson, J. L. E..............St. Paul
Peterson, V. N.................St. Paul
Plondke, F. J...................St. Paul
Prendergast, H. J..............St. Paul
Prins, L. R., Jr.................St. Paul
Ramsey, W. R..................St. Paul
Richards, E. T. F..............St. Paul
Richardson, H. E..............St. Paul
Ritchie, H. P...................St. Paul
Rogers, F. D....................St. Paul
Rogers, J. T....................St. Paul
Rogers, S. F....................St. Paul
Rosenholtz, Burton...........St. Paul
Rosenthal, Robert.............St. Paul
Rothrock, J. L..................St. Paul
Rothschild, H. J................St. Paul
Roy, Philemon..................St. Paul
Ruhberg, G. N..................St. Paul
Rutherford, W. C..............St. Paul
Ryan, J. J........................St. Paul
Ryan, J. M.......................St. Paul
Ryan, M. E.......................St. Paul
Satterlund, V. L.................St. Paul
Savage, F. J......................St. Paul
Schoch, R. B.....................St. Paul
Schons, Edward.................St. Paul
Schuldt, F. C.....................St. Paul
Schulze, A. G....................St. Paul
Schwyzer, Arnold..............St. Paul
Scott, E. E........................St. Paul
Senkler, G. E.....................St. Paul
Setzer, H. J.......................St. Paul
Shellman, J. L....................St. Paul
Shillington, M. A................St. Paul
Short, Jacob.......................St. Paul
Singer, B. J........................St. Paul
Skinner, H. O.....................St. Paul
Smisek, E. A......................St. Paul
Snyder, G. W.....................St. Paul
Sohlberg, O. I.....................St. Paul
Souster, B. B......................St. Paul
Sprafka, J. M......................St. Paul
Sterner, E. G.......................St. Paul
Stevens, F. A...............Lake Elmo
Stewart, Alexander...............St. Paul
Stinnette, S. E.....................St. Paul
Stoeckmann, A. E.................St. Paul
Strate, G. E.........................St. Paul
Swanson, E. O......................St. Paul
Swanson, J. A.......................St. Paul
Swendson, J. J......................St. Paul
Teisberg, C. B.......................St. Paul
Thompson, F. A.....................St. Paul
Thoreson, M. O......................St. Paul
Tifft, C. R.............................St. Paul
Tregilgas, H. R...............So. St. Paul
Van Slyke, C. A.....................St. Paul
Veirs, Dean...........................St. Paul
Veirs, Ruby S........................St. Paul
Venables, A. E.......................St. Paul
Von der Weyer, William.........St. Paul
Waas, C. W...........................St. Paul
Walker, A. E..........................St. Paul
Walter, C. W..........................St. Paul
Warnock, R. W.......................St. Paul
Warren, E. L..........................St. Paul
Watz, C. E.............................St. Paul
Welch, M. C...........................St. Paul
Werner, O. S....................Cambridge
Wheeler, M. W.......................St. Paul
Whitacre, J. C........................St. Paul
Whitmore, Frank.....................St. Paul
Williams, C. K........................St. Paul
Williamson, G. A....................St. Paul
Wilson, J. A...........................St. Paul
Wilson, J. V...........................St. Paul
Winnick, J. B..........................St. Paul
Wold, K. C.............................St. Paul
Wolfe, H. H............................St. Paul
Wolff, H. J..............................St. Paul
Youngren, E. R.......................St. Paul
Zachman, L. L.........................St. Paul
Zander, C. H...........................St. Paul
Zimmermann, H. B..................St. Paul

RED RIVER VALLEY MEDICAL SOCIETY

Kittson, Mahnomen, Marshall, Norman, Pennington, Polk, Red Lake and Roseau Counties
Regular meetings, Second Tuesday, April, October and December
Annual meeting, Second Tuesday, December
Number of Members: 51

President
Swedenburg, A. W...Thief River Falls

Secretary
Froats, C. W.........Thief River Falls

Adkins, C. M........Thief River Falls
Anderson, W. S...........Minneapolis
Bernard, B. C.......Thief River Falls
Bertelson, O. L..............Crookston
Biedermann, Jacob...Thief River Falls
Blegen, H. M.....................Warren
Boardman, D. V..........Twin Valley
Bohl, G. W..........................Ada
Bratrud, O. E.......Thief River Falls
Brown, L. L...................Crookston
Button, A. J..................Pine River
Carlson, C. E....................Stephen
Culver, L. G.........Thief River Falls
Delmore, J. L....................Roseau
Erickson, Eskil..................Halstad
Froats, C. W........Thief River Falls
Griffin, P. J.......................Fertile
Hansen, Marius......................Ada
Haugseth, Enoch.........Twin Valley
Henney, W. H.................McIntosh
Hollands, W. H....................Fisher
Holmstrom, C. H.................Warren
Holte, Halvor..................Crookston
Kirk, G. P..........East Grand Forks
Knutson, G. A.................Greenbush
Leitch, N. M......................Warroad
Locken, O. E...................Crookston
Lynde, O. G.........Thief River Falls
Mellby, O. F........Thief River Falls
Mercil, W. F...................Crookston
Morley, G. A...................Crookston
Nelson, H. E...................Crookston
Norman, J. F...................Crookston
Ohnstad, J. L...................McIntosh
Oppegaard, C. L..............Crookston
Oppegaard, M. O.............Crookston
Overend, K. V....................Hallock
Paradis, W. G..................Crookston
Parsons, J. G...................Crookston
Reff, A. R........................Crookston
Roy, J. A..................Red Lake Falls
Shaleen, A. W....................Hallock
Shedlov, Abraham...............Fosston
Smith, A. M........Thief River Falls
Stuurmanns, S. H..................Erskine
Swedenburg, A. W...Thief River Falls
Swedenburg, P. A.........Chula, Ark.
Torgerson, W. B.....................Oklee
Watson, N. M.........Red Lake Falls
Weed, V. A...........Red Lake Falls
Wiltrout, I. G.........................Oslo

REDWOOD-BROWN COUNTY MEDICAL SOCIETY

Annual meeting, May
Number of Members: 25

President
Kusske, A. L................New Ulm

Secretary
Saffert, C. A................New Ulm

Brey, F. W...................Wabasso
Dubbe, F. H.................New Ulm
Dysterheft, A. F..............Gaylord
Fritsche, Albert.............New Ulm
Fritsche, C. J................New Ulm
Gibbons, F. C................Comfrey
Goblirsch, A. P............Sleepy Eye
Hammermeister, T. F........New Ulm
Hovde, Rolf...................Winthrop
Jamieson, Earl..........Walnut Grove
Johnson, W. E..................Morgan
Just, H. J.....................Lafayette
Kolset, C. D...................Sanborn
Kusske, A. L..................New Ulm
Olson, K. L......................Gibbon
Peterson, R. A....................Vesta
Reineke, G. F..................New Ulm
Rothenburg, J. C............Springfield
Saffert, C. A...................New Ulm
Seifert, O. J.....................New Ulm
Shrader, J. S..................Hollandale
Vogel, H. A. L..................New Ulm
Vogel, J. H......................New Ulm
Weiser, G. B....................New Ulm
Wohlrabe, E. J...............Springfield

RENVILLE COUNTY MEDICAL SOCIETY

Regular meeting, First Tuesday of each month
Annual meeting, First Tuesday of November
Number of Members: 17

President
Madland, R. S..................Fairfax

Secretary
Dordal, J...............Sacred Heart

Adams, R. C.............Bird Island
Billings, R. E................Franklin
Brand, W. A...........Redwood Falls
Cole, H. B.............Redwood Falls
Cole, J. G.............Redwood Falls
Cosgriff, J. A...............Bird Island
Dordal, J.................Sacred Heart
Fawcett, A. M................Renville
Flinn, T. E............Redwood Falls
Gaines, E. C...............Buffalo Lake
Johnson, O. H.........Redwood Falls
Loenholdt, E. H...................Hector
Madland, R. S....................Fairfax
Mesker, G. H......................Olivia
Passer, A. A.......................Olivia
Penhall, F. W.....................Morton
Solsem, F. N...............Sacred Heart

RICE COUNTY MEDICAL SOCIETY

Regular meeting, At call
Annual meeting, December
Number of Members: 39

President

Murdoch, J. M. . . . . Faribault

Secretary

Plonske, C. J. . . . . Faribault

Babcock, F. M.	Northfield
Beede, Ethel R.	Faribault
Davis, F. U.	Faribault
Dugan, L. F.	Faribault
Dungay, N. S.	Northfield
Engstrom, F. A.	Wanamingo
Francis, D. W.	Faribault
Hanson, A. M.	Faribault
Huxley, F. R.	Faribault
Haessly, S. B.	Faribault
Hamilton, Angie G. S.	Northfield
Haynes, A. L.	Faribault
Kanne, C. W.	Faribault
Kucera, S. T.	Lonsdale
Kuske, A. W.	Faribault
Lufkin, C. D.	Northfield
Lende, Norman	Faribault
Lexa, F. J.	Lonsdale
Mayland, M. L.	Faribault
Meyer, F. C.	Kenyon
Meyer, P. F.	Faribault
Moses, Joseph, Jr.	Northfield
Murdoch, J. M.	Faribault
Nuetzman, A. W.	Faribault
Plonske, C. J.	Faribault
Robilliard, C. M.	Faribault
Rumpf, C. W.	Faribault
Rumpf, W. H.	Faribault
Rudie, C. N.	Kenyon
Rohrer, C. A.	Waterville
Seeley, I. F.	Northfield
Smith, P. A.	Faribault
Stewart, Gwendolyn	Faribault
Traeger, C. A.	Faribault
Thorson, O. P.	Northfield
Warren, F. S.	Washington, D. C.
Wilkowske, R. J.	Nerstrand
Wilson, W. E.	Northfield
Wilson, Warren	Northfield

ST. LOUIS COUNTY MEDICAL SOCIETY

Carlton, Cook, Itasca, Lake and St. Louis Counties
Regular meeting, Second Thursday every month
Annual meeting, October
Number of Members: 160

President

Bagley, W. R. . . . . Duluth

Secretary

Gillespie, M. G. . . . . Duluth

Adams, B. S.	Hibbing
Akins, W. M.	Eveleth
Alexander, C. E.	Duluth
Armstrong, E. L.	Duluth
Athens, A. G.	Duluth
Ayres, G. T.	Ely
Bagley, W. R.	Duluth
Bardon, Richard	Duluth
Barney, L. A.	Duluth
Barrett, E. E.	Duluth
Berdez, G. L.	Duluth
Bergquist, K. E.	Duluth
Bianco, A. J.	Duluth
Binet, H. E.	Grand Rapids
Blacklock, S. S.	Hibbing
Blakely, C. C.	Barnum
Boman, P. G.	Duluth
Bowen, R. L.	Hibbing
Boyer, S. H., Jr.	Duluth
Boyer, S. H., Sr.	Duluth
Braverman, N. J.	Duluth
Bray, C. W.	Biwabik
Bray, P. N.	Duluth
Bullen, F. W.	Hibbing
Cantwell, W. F.	International Falls
Carstens, C. F.	Hibbing
Chapman, T. L.	Duluth
Clement, T. G.	Duluth
Collins, A. N.	Duluth
Collins, H. C.	Duluth
Coventry, W. A.	Duluth
Davis, B. F.	Duluth
Doolittle, L. E.	Duluth
Doyle, G. C.	Duluth
Drenning, F. C.	Duluth
Eckman, P. F.	Duluth
Eckman, R. J.	Duluth
Ekblad, J. W.	Duluth
Elias, F. J.	Duluth
Emanuel, K. W.	Duluth
Eppard, R. M.	Cloquet
Ewens, H. B.	Virginia
Fawcett, K. R.	Duluth
Fellows, M. F.	Duluth
Feuling, John	Bovey
Fiala, M. J.	Duluth
Fischer, M. McC.	Duluth
Garrow, D. M.	Ely
Gillespie, M. G.	Duluth
Gillespie, N. H.	Duluth
Gowan, L. R.	Duluth
Graham, Robert	Duluth
Graves, W. N.	Duluth
Haney, C. L.	Duluth
Harris, C. N.	Nashwauk
Hatch, W. E.	Duluth
Hathaway, S. J.	Proctor
Hayes, M. F.	Nashwauk
Hedberg, G. A.	Nopeming
Heiam, W. C.	Cook
Heimark, O. E.	Duluth
Hilding, A. C.	Duluth
Hill, F. E.	Duluth
Hirschboeck, F. J.	Duluth
Hirschfield, M. S.	Duluth
Jacobson, Clarence	Chisholm
Jensen, T. J.	Duluth
Jolin, F. M.	Grand Rapids
Karleen, P. E.	Deer River
Keyes, C. R.	Duluth
Klein, Harry	Duluth
Knapp, F. N.	Duluth
Kohlbry, C. O.	Duluth
Kotchevar, F. R.	Eveleth
Kraft, Peter	Duluth
Krantz, C. I.	Duluth
Kuth, J. R.	Duluth
Laird, A. T.	Nopeming
Lenont, C. B.	Virginia
Lepak, F. J.	Duluth
Litman, S. N.	Duluth
Loofbourrow, E. H.	Keewatin
Lum, C. E.	Nisswa
MacRae, G. C.	Duluth
Magney, F. H.	Duluth
Malmstrom, J. A.	Virginia
Martin, E. T.	Duluth
Martin, W. C.	Duluth
Mayne, R. M.	Duluth
McCarty, P. D.	Ely
McComb, C. F.	Duluth
McCoy, Mary K.	Duluth
McDaniel, S. P.	Mountain Iron
McDonald, A. L.	Duluth
McNutt, J. R.	Duluth
Mead, C. H.	Duluth
Mead, N. C.	Coleraine
Merriman, L. L.	Duluth
Miners, G. A.	Deer River
Moe, R. J.	Duluth
Monroe, P. B.	Two Harbors
Mooney, L. P.	Marble
More, C. W.	Eveleth
Morsman, L. W.	Hibbing
Morss, C. R.	Zumbrota
Mueller, S. C.	Duluth
Nelson, E. H.	Chisholm
Nelson, R. L.	Duluth
Nicholson, M. A.	Duluth
Nutting, R. E.	Duluth
Olson, A. E.	Duluth
Parker, O. W.	Ely
Pennie, D. F.	Duluth
Peterson, E. N.	Eveleth
Peterson, J. H.	Duluth
Power, J. E.	Duluth
Raadquist, C. S.	Hibbing
Raiter, F. W. S.	Cloquet
Raiter, R. F.	Cloquet
Robinson, J. M.	Duluth
Rood, D. C.	Hibbing
Rowe, O. W.	Duluth
Rudie, P. S.	Duluth
Ryan, W. J.	Duluth
Salter, R. A.	Virginia
Sarff, O. E.	Buhl
Scherer, C. A.	Duluth
Schroder, C. H.	Duluth
Seashore, D. E.	Duluth
Seashore, R. T.	Duluth
Shapiro, E. Z.	Duluth
Shastid, T. H.	Duluth
Shaw, A. W.	Buhl
Sinamark, Andrew	Hibbing
Slyfield, F. F.	Duluth
Smith, C. M.	Duluth
Smith, W. R.	Grand Marais
Spicer, F. W.	Duluth
Spurbeck, R. G.	Cloquet
Strathern, M. L.	Gilbert
Strobel, W. G.	Duluth
Stewart, A. B.	Cloquet
Sukeforth, L. A.	Duluth
Sutherland, H. N.	Ely
Swanson, P. E.	Virginia
Swenson, A. O.	Duluth
Tibbetts, M. H.	Duluth
Tilderquist, D. L.	Duluth
Tuohy, E. L.	Duluth
Urberg, S. E.	Duluth
Vercellini, C. E.	Duluth
Walker, A. E.	Duluth
Webber, E. E.	Duluth
West, E. J.	Duluth
Wheeler, D. W.	Duluth
Wilkinson, Stella L.	Duluth
Winter, J. A.	Duluth
Young, T. O.	Duluth
Young, V. A.	Duluth
Zlatovski, Michael	Duluth

SCOTT-CARVER COUNTY MEDICAL SOCIETY

Regular meetings, Second Tuesday of the month
Annual meeting, Second Tuesday, June
Number of Members: 28

President

Martin, T. P. . . . . Arlington

Secretary

Hospodarsky, L. J. . . . . New Prague

Buck, F. H.	Shakopee
Cervenka, C. F.	New Prague
Eklund, E. J.	Norwood
Emmerson, W. S.	Mayer
Fischer, H. P.	Shakopee
Fischer, P. M.	Shakopee
Havel, H. W.	Shakopee
Hebeisen, M. B.	Chaska
Henriksen, H. G.	Elko
Hospodarsky, L. J.	New Prague
Juergens, H. M.	Belle Plaine
Lightbourn, E. T.	Jordan
Maertz, W. F.	New Prague
Martin, T. P.	Arlington
Nagel, H. D.	Waconia
Novak, E. E.	New Prague
Olson, C. J.	Belle Plaine
Ormond, D. T.	Waconia
Phillips, W. H.	Jordan
Reiter, H. W.	Shakopee
Schimelpfening, G. T.	Chaska
Schneider, H. A.	Jordan
Simons, B. H.	Chaska
Stein, K. E.	Lakeville
Westerman, A. E.	Montgomery
Westerman, F. C.	Montgomery
Woodworth, L. F.	Le Center
Wunder, H. E.	Shakopee

SOUTHWESTERN MINNESOTA MEDICAL SOCIETY

Cottonwood, Jackson, Murray, Nobles, Pipestone, and Rock Counties
Regular meetings, Spring and Fall
Annual meeting, November
Number of Members: 53

President
Halloran, W. H..............Jackson

Secretary
DeBoer, Hermanus..........Edgerton

Arnold, E. W..................Adrian
Basinger, H. P..............Windom
Basinger, H. R.........Mountain Lake
Benjamin, W. G............Pipestone
Bofenkamp, F. W............Luverne
Brown, A. H................Pipestone
Chadbourn, A. G..........Heron Lake
Cress, P. J..................Ellsworth
DeBoer, Hermanus..........Edgerton
Dolan, C. P.............Worthington
Doms, H. C..................Slayton
Dudley, J. H..................Windom
Engh, Sigfred ....Jackson
Halloran, W. H..............Jackson
Halpern, D. J...............Brewster
Harrison, P. W.........Worthington
Hitchings, W. S.............Lakefield
Johnson, R. E...........Worthington
Kelling, L. F................Lakefield
Kilbride, E. A...........Worthington
Larson, J. T.............Lake Wilson
Lindahl, M. J..................Jasper
Lowe, Thos. ....Pipestone
Maitland, D. P...............Jackson
Manson, F. M...........Worthington
McCrea, J. M...................Fulda
McKeown, E. G............Pipestone
McLane, Evelyn G............Jackson
McLane, W. O................Jackson
Mork, B. O...............Worthington
Mork, B. O., Jr.........Worthington
Pankratz, P. J.........Mountain Lake
Pertl, A. L...................Windom
Piper, W. A...........Mountain Lake
Portmann, W. C..............Jackson
Priest, R. E.............Worthington
Rose, J. T.....................Lakefield
Ross, W. P...............Worthington
Schutz, E. S.........Mountain Lake
Sherman, C. L...............Luverne
Slater, S. A.............Worthington
Sogge, L. L....................Windom
Sorenson, E. M..........Round Lake
Stanley, C. R...........Worthington
Stevenson, B. M.................Fulda
Stratte, H. C..................Windom
Thorson, E. O................Luverne
Tofte, Josephine ....Dawson
Waller, J. D...................Wilmont
Williams, A. B...............St. Paul
Williams, C. A.............Pipestone
Williams, L. A.................Slayton
Wright, C. O....................Luverne

STEARNS-BENTON COUNTY MEDICAL SOCIETY

Regular meetings, Third Thursday of the month
Annual meeting, Third Thursday of December
Number of Members: 39

President
Goehrs, H. W..............St. Cloud

Secretary
Libert, J. N.................St. Cloud

Beuning, J. B...................Albany
Brigham, C. F..............St. Cloud
Buscher, J. C...............St. Cloud
DuBois, J. A............Sauk Center
DuBois, J. F............Sauk Center
Engstrom, G. F..............Belgrade
Freeman, W. L..............St. Cloud
Friesleben, Wm..........Sauk Rapids
Gelz, J. J....................St. Cloud
Goehrs, H. W..............St. Cloud
Haberman, Emil ....Osakis
Hemstead, Werner..........St. Cloud
Johnson, Walfred.........Sauk Center
Jones, R. N..................St. Cloud
Kettlewell, R. B..........Sauk Center
Kohler, D. W..............St. Joseph
Koop, S. H..................Richmond
Kuhlmann, August...........Melrose
Lewis, C. B..................St. Cloud
Libert, J. N.................St. Cloud
McDowell, J. P.............St. Cloud
Mahowald, A..................Albany
Mass, Max ....Cold Spring
Meyer, A. A...................Melrose
Moynihan, A. F.........Sauk Center
Myre, C. R................Paynesville
Norris, G. H...............Annandale
Rathbun, A. M......................Rice
Rathbun, C. A...............St. Cloud
Richards, W. B..............St. Cloud
Ridgeway, Alexander.....South Haven
Rydburg, W. C................Brooten
Schatz, F. J...................St. Cloud
Sherwood, G. E...............Kimball
Stangl, Fred.................St. Cloud
Stangl, P. E...................St. Cloud
Sutton, C. S..................St. Cloud
Wenner, W. T................St. Cloud
Zachman, A. H................Melrose

STEELE COUNTY MEDICAL SOCIETY

Regular meetings, Second Tuesday of odd months
Annual meeting, Last meeting of the year
Number of Members: 18

President
Dewey, D. H................Owatonna

Secretary
Berghs, L. V................Owatonna

Berghs, L. V................Owatonna
Carlson, Verne.......Blooming Prairie
Dewey, D. H................Owatonna
Ertel, E. Q...................Ellendale
Farabaugh, C. L............Owatonna
Flores, O. T............Dodge Center
Hartung, E. H..............Claremont
Kreuzer, T. C...............Owatonna
McEnaney, C. T.............Owatonna
McIntyre, J. A.............Owatonna
Melby, Benedik.......Blooming Prairie
Morehead, D. E.............Owatonna
Nelson, E. J..................Owatonna
Roberts, O. W...............Owatonna
Schaefer, J. F...............Owatonna
Senn, E. W...................Owatonna
Smersh, J. F.................Owatonna
Stewart, A. B................Owatonna

UPPER MISSISSIPPI MEDICAL SOCIETY

Aitkin, Beltrami, Cass, Clearwater, Crow Wing, Hubbard, Koochiching, Lake of the Woods, Morrison, Todd and Wadena Counties
Regular meetings, Spring, Summer, Fall, Winter
Annual meeting, January
Number of Members: 79

President
Simons, E. J................Swanville

Secretary
Badeaux, G. I................Brainerd

Agnew, A. T........International Falls
Anderson, C. E..............Brainerd
Badeaux, G. I................Brainerd
Beise, R. A....................Brainerd
Blomberg, W. R................Aitkin
Borgerson, A. H...............Sebeka
Bosland, H. G...............Verndale
Bowers, J. T..................Bemidji
Brink, A. A...................Baudette
Burns, H. A...........Ah-Gwah-Ching
Christie, G. R............Long Prairie
Christie, R. L............Long Prairie
Cook, J. M.....................Staples
Corrigan, J. E................Spooner
Craig, C. C........International Falls
Davis, L. T....................Wadena
Davis, T. C....................Wadena
Frost, H. T....................Wadena
Garlock, A. V.................Bemidji
Garlock, D. H.................Bemidji
Gerber, M. P.................Brainerd
Ghostley, Mary C............Puposky
Gifford, B. L...................Hewitt
Grawn, F. A................Northome
Grogan, J. S...................Wadena
Groschupf, T. P...............Bemidji
Grose, F. N...................Clarissa
Hanover, R. D.............Littlefork
Hanson, E. C............Park Rapids
Hawkinson, J. P...............Crosby
Hawkinson, L. F.............Brainerd
Healy, R. T.......................Pierz
Hendrickson, R. R...........Wadena
Higgs, W. W............Park Rapids
Holst, C. F................Little Falls
Holst, J. B................Little Falls
Holt, G. W..........................Ely
House, Z. E.................Cass Lake
Houston, C. A...........Park Rapids
Hubbard, O. E...............Brainerd
Hubin, E. G.................Deerwood
Jacobson, D. J............Blackduck
Johnson, E. W................Bemidji
Kelly, B. W.....................Aitkin
Kerlan, S. Z....................Aitkin
Lamb, H. L................Little Falls
Laney, R. L.....................Fertile
Larson, L. M............Oak Terrace
Larson, L. J.....................Bagley
Laughlin, J. T............Grey Eagle
Marcum, E. H.................Bemidji
Mark, Hilbert..........Ah-Gwah-Ching
McHugh, R. F....................Aitkin
Mosby, M. E...............Browerville
Moyer, R. E............Fort Snelling
Nelson, Nesmith..............Brainerd
Osburn, B. F.......International Falls
Pierce, C. H....................Wadena
Quanstrom, V. E.............Brainerd
Raymond, J. H..............Cass Lake
Ringle, O. F.....................Walker
Roberts, L. M.............Little Falls
Rosenfield, A. B.................Pequot
Sach-Rowitz, Alvin........Moose Lake
Sellers, G. K....................Motley
Shannon, S. S..................Crosby
Simons, E. J.................Swanville
Smith, B. A......................Crosby
Smith, E. H.....................Bemidji
Smith, E. H................Eagle Bend
Stein, R. J.........................Pierz
Stevens, John.................Gonvick
Thabes, J. A., Jr.............Brainerd
Thabes, J. A., Sr.............Brainerd
Van Valkenburg, B. F....Long Prairie
Watson, A. M.................Royalton
Watson, J. D..............Holdingford
Will, W. W.......................Bertha
Withrow, M. E.....International Falls

WABASHA COUNTY MEDICAL SOCIETY

Regular meetings, Call of Officers
Annual meeting, First Thursday after first Monday in July
Number of Members: 11

President
Radabaugh, R. C.............Hastings

Secretary
Wilson, W. F..............Lake City

Bayley, E. C..............Lake City
Cochrane, W. J.............Lake City
Collins, J. S..............Wabasha
Fleischhauer, D. S..............Wabasha
Flesche, B. A.............Lake City
Frost, R. H..............Wabasha
Ochsner, C. G..............Wabasha
Radabaugh, R. C.............Hastings
Sherman, H. T.............Plainview
Slocumb, J. A.............Plainview
Wilson, W. F..............Lake City

WASECA COUNTY MEDICAL SOCIETY

Annual meeting, Third Friday in December
Number of Members: 9

President
Swenson, O. J..............Waseca

Secretary
Chadbourn, C. R...........Janesville

Bernstein, W. C.........New Richland
Chadbourn, C. R...........Janesville
Gallagher, B. J..............Waseca
Hottinger, R. C...........Janesville
Lynn, J. F..............Waseca
McIntire, H. M..............Waseca
Oeljen, S. C. G..............Waseca
Swenson, O. J..............Waseca
Tavenner, J. L..............Waseca

WASHINGTON COUNTY MEDICAL SOCIETY

Regular meetings, Second Tuesday in January, February, March, April, May,
September, October, November and December
Annual meeting, Second Tuesday in December
Number of Members: 16

President
Brooks, G. F..............Stillwater

Secretary
Boleyn, E. S..............Stillwater

Boleyn, E. S..............Stillwater

Brekke, H. J..............Stillwater
Brooks, G. F..............Stillwater
Ewald, R. P..............Newport
Haines, J. H..............Stillwater
Humphrey, W. R...........Stillwater
Josewski, R. J..............Stillwater
Kalinoff, D..............Stillwater
Linner, Gunnar.............Stillwater
Mingo, F. E..............Hugo
Poirer, J. A.............Forest Lake
Ruggles, G. McC.........Forest Lake
Strand, E. V..............Bayport
Stuhr, J. W..............Stillwater
Thompson, V. C....Marine-on St. Croix
Van Meier, Henry..........Stillwater

WATONWAN COUNTY MEDICAL SOCIETY

Regular meeting, At call
Annual meeting, December
Number of Members: 8

President
Thompson, Albert...........St. James
Secretary
Grimes, H. B..............Madelia

Bergman, O. B.............St. James
Bratrude, E. J.............St. James
Bregel, F. L..............St. James
Grimes, H. B..............Madelia
Hagen, O. E..............Butterfield
Haynes, B. H..............Lewisville
McCarthy, W. J..............Madelia
Thompson, Albert...........St. James

WEST CENTRAL MINNESOTA MEDICAL SOCIETY

Big Stone, Pope, Stevens and Traverse Counties
Regular meetings, Second Wednesday of January, April and June
Annual meeting, Second Wednesday, October
Number of Members: 24

President
Giesen, A. F..............Starbuck

Secretary
Nelson, M. C..............Lowry

Arneson, A. I..............Morris
Bates, B. V............Browns Valley
Bergan, Otto..............Clinton
Bolsta, Chas..............Ortonville

Caine, C. E..............Morris
Cumming, J. F..............Morris
Doleman, N. F..............Tintah
Eberlin, E. A..............Glenwood
Elsey, E. McC..............Glenwood
Elsey, J. R..............Glenwood
Ewing, C. F..............Wheaton
Fitzgerald, E. T..............Morris
Giesen, A. F..............Starbuck
Karn, B. R..............Ortonville
Leland, J. T..............Herman
Lindberg, A. L..............Wheaton
Linde, Herman..............Cyrus
McIver, B. A..............Lowry
McKenna, M. J.............Graceville
Nelson, M. C..............Lowry
Oliver, C. I..............Graceville
Oliver, I. L..............Graceville
Ransom, M. L..............Hancock
Shelver, H. J..............Ortonville

WINONA COUNTY MEDICAL SOCIETY

Regular meetings, First Monday in January, April, July and October
Annual meeting, First Monday in January
Number of Members: 24

President
Christensen, E. E.............Winona

Secretary
Steiner, I. W..............Winona

Benoit, F. T..............Winona
Christensen, E. E.............Winona
Clay, F. H..............St. Charles
Heise, W. F. C..............Winona

Keyes, J. D..............Winona
Kroning, C. G.............St. Charles
Litchtenstein, H..............Winona
Lindsay, W. V..............Winona
Mattison, P. A..............Winona
McLaughlin, E. M...........Winona
Meinert, A. E..............Winona
Nauth, W. W..............Winona
Neumann, C. A..............Winona
Page, R. L..............St. Charles
Risser, E. D..............Winona
Robbins, C. P..............Winona
Satterlee, H. W..............Lewiston
Schaefer, S..............Winona
Steiner, I. W..............Winona
Tweedy, G. J..............Winona
Walker, G. H..............Winona
Wilson, R. H..............Winona
Younger, L. I..............Winona
Zintex, A. R..............Winona

WRIGHT COUNTY MEDICAL SOCIETY

Regular meeting, First Tuesday after first Monday, Quarterly
Annual meeting, October
Number of Members: 21

President
Hart, W. E..............Monticello

Secretary
Catlin, J. J..............Buffalo

Anderson, W. P..............Buffalo
Bendix, L. H..............Annandale
Catlin, J. J..............Buffalo

Catlin, T. J..............Buffalo
Ellison, F. E..............Monticello
Grundset, O. J..............Montrose
Hansen, Rorbye.............Monticello
Harriman, L.............Howard Lake
Hart, W. E..............Monticello
Hoyer, L. J.............Howard Lake
Johnson, V. P..............Delano
Klaveness, E..............St. Paul
Lee, J. L..............Watertown
Olson, J. W..............Cokato
Peterson, O. L..............Cokato
Phillips, A. E..............Delano
Roholt, C. L..............Waverly
Rousseau, Victor..........Maple Lake
Ridgway, A. M.............Annandale
Swezey, B. F..............Buffalo
Thompson, Arthur.............Cokato

ALPHABETIC ROSTER

Aanes, A. M.	Red Wing
Abbott, J. S.	St. Paul
Aborn, W. H.	Hawley
Adams, B. S.	Hibbing
Adams, R. C.	Bird Island
Adkins, C. M.	Thief River Falls
Adson, A. W.	Rochester
Affeldt, D. E.	Kasson
Agnew, A. T.	International Falls
Ahrens, A. E.	St. Paul
Ahrens, A. H.	St. Paul
Ahrens, R. S.	Minneapolis
Aitkens, H. B.	Le Center
Akester, Ward	Marshall
Akins, W. M.	Eveleth
Albers, E. C.	Champaign, Ill.
Alberts, M. W.	St. Paul
Alden, J. F.	St. Paul
Alexander, C. E.	Duluth
Alexander, F. H.	St. Paul
Alexander, H. A.	Minneapolis
Aling, C. A.	Minneapolis
Allen, A. W.	Austin
Allen, C. C.	Austin
Allen, E. V.	Rochester
Allen, H. W.	Minneapolis
Allison, R. G.	Minneapolis
Altnow, H. O.	Minneapolis
Alvarez, W. C.	Rochester
Amberg, Samuel	Rochester
Andersen, A. G.	Minneapolis
Andersen, S. C.	Minneapolis
Anderson, C. E.	Brainerd
Anderson, C. M.	Rochester
Anderson, C. R.	Rochester
Anderson, D. D.	Minneapolis
Anderson, E. D.	Minneapolis
Anderson, E. R.	Minneapolis
Anderson, F. J.	Minneapolis
Anderson, J. K.	Minneapolis
Anderson, K. W.	Minneapolis
Anderson, M. J.	Rochester
Anderson, N. E.	Harmony
Anderson, P. A.	Minneapolis
Anderson, R. E.	Willmar
Anderson, S. H.	Red Wing
Anderson, U. S.	Minneapolis
Anderson, W. P.	Buffalo
Anderson, W. S.	Minneapolis
Andreassen, E. C.	Minneapolis
Andrews, R. N.	Mankato
Annis, H. B.	Minneapolis
Archibald, F. M.	Mahnomen
Arends, A. L.	Askov
Arey, S. L.	Excelsior
Arlander, C. E.	Minneapolis
Armstrong, E. L.	Duluth
Armstrong, J. M.	St. Paul
Arneson, A. I.	Morris
Arnold, D. C.	Minneapolis
Arnold, E. W.	Adrian
Arnquist, A. S.	St. Paul
Arnson, J. M.	Benson
Arvidson, C. G.	Minneapolis
Athens, A. G.	Duluth
Aune, Martin	Minneapolis
Aurand, W. H.	Minneapolis
Aurelius, J. R.	St. Paul
Ausman, C. F.	St. Paul
Avery, J. F.	Minneapolis
Ayres, G. T.	Ely
Babcock, F. M.	Northfield
Backus, A. S.	St. Paul
Bacon, D. K.	St. Paul
Bacon, L. C.	St. Paul
Bacon, R. S.	Montevideo
Badeaux, G. I.	Brainerd
Bagley, W. R.	Duluth
Bailey, H. B.	Fairmont
Bailey, R. J.	Rochester
Bair, H. L.	Rochester
Baken, M. P.	Minneapolis
Baker, A. C.	Fergus Falls
Baker, A. T.	Minneapolis
Baker, C. P.	Rochester
Baker, E. L.	Minneapolis
Baker, H. R.	Hayfield
Baker, Looe	Minneapolis
Baker, N. H.	Fergus Falls
Baker, T. W.	Rochester
Balcome, M. M.	St. Paul
Balfour, D. C.	Rochester
Bannick, E. G.	Rochester
Barher, J. P.	Minneapolis
Bardon, Richard	Duluth
Bargen, J. A.	Rochester
Barker, N. W.	Rochester
Barnes, A. R.	Rochester
Barney, L. A.	Duluth
Barr, W. H.	Wells
Barrett, E. E.	Floodwood
Barron, Moses	Minneapolis
Barry, L. W.	St. Paul
Barsness, Nellie	St. Paul
Basinger, H. P.	Windom
Basinger, H. R.	Mountain Lake
Bass, G. W.	Minneapolis
Bates, B. V.	Browns Valley
Baxter, S. H.	Minneapolis
Bayard, H. F.	Minneapolis
Bayley, E. C.	Lake City
Beadie, W. D.	Cannon Falls
Beals, Hugh	St. Paul
Beard, A. H.	Minneapolis
Beard, R. O.	Minneapolis
Beaver, D. C.	Rochester
Beckman, W. G.	Minneapolis
Bedard, R. E.	Rochester
Bedford, E. W.	Minneapolis
Beede, Ethel R.	Faribault
Behmler, F. W.	Appleton
Beise, R. A.	Brainerd
Beiswanger, R. H.	Wykoff
Bell, C. C.	St. Paul
Bell, E. T.	Minneapolis
Belote, G. B.	Caledonia
Bendix, L. H.	Annandale
Benedict, W. L.	Rochester
Benepe, J. L.	St. Paul
Benham, E. W.	Mankato
Benjamin, A. E.	Minneapolis
Benjamin, E. G.	Minneapolis
Benjamin, W. G.	Pipestone
Benn, F. G.	Minneapolis
Bennion, P. H.	St. Paul
Benoit, F. T.	Winona
Bentley, N. P.	St. Paul
Berdez, G. L.	Duluth
Bergan, Otto	Clinton
Berger, A. G.	Minneapolis
Bergh, L. N.	Montevideo
Bergheim, M. C.	Hawley
Berghs, L. V.	Owatonna
Bergman, O. B.	St. James
Bergquist, K. E.	Duluth
Berkman, D. M.	Rochester
Berkman, J. M.	Rochester
Berkwitz, N. J.	Minneapolis
Bernard, B. C.	Thief River Falls
Bernstein, W. C.	New Richland
Berrisford, P. D.	St. Paul
Bertelson, O. L.	Crookston
Bessesen, A. N., Jr.	Minneapolis
Bessesen, D. H.	Minneapolis
Bessesen, W. A.	Minneapolis
Betlach, C. J.	Rochester
Beuning, J. B.	Albany
Bianco, A. J.	Duluth
Bicek, J. F.	St. Paul
Biedermann, Jacob	Thief River Falls
Bigelow, C. E.	Dodge Center
Billings, R. E.	Franklin
Binet, H. E.	Grand Rapids
Binger, H. E.	St. Paul
Binger, M. W.	Rochester
Birnberg, T. L.	St. Paul
Black, William	Mankato
Blacklock, S. S.	Hibhing
Blake, James	Hopkins
Blake, T. W.	Rochester
Blakely, C. C.	Barnum
Blakey, A. R.	Osakis
Blanchard, H. G.	Fairmont
Blegen, H. M.	Warren
Blomberg, W. R.	Aitkin
Blum, B. B.	Rochester
Blumenthal, J. S.	Columbia Heights
Boardman, D. V.	Twin Valley
Bock, R. A.	St. Paul
Bockman, M. W. H.	Minneapolis
Boeckmann, Egil	St. Paul
Bofenkamp, F. W.	Luverne
Bohl, G. W.	Ada
Bohland, E. H.	St. Paul
Boies, L. R.	Minneapolis
Bolender, H. L.	St. Paul
Boleyn, E. S.	Stillwater
Boline, C. A.	Battle Lake
Bolsta, Charles	Ortonville
Boman, P. G.	Duluth
Booth, A. E.	Minneapolis
Boothby, W. M.	Rochester
Boreen, C. A.	Minneapolis
Borg, J. F.	St. Paul
Borgerson, A. H.	Sebeka
Borgeson, E. J.	Minneapolis
Bosland, H. G.	Verndale
Bossert, C. S.	Mora
Bossingham, O. N.	Lake Benton
Bottolfson, B.T.	Moorhead
Bouma, L. R.	St. Paul
Bouman, H. A. H.	Minneapolis
Bowen, R. L.	Hibbing
Bowers, J. T.	Bemidji
Bowing, H. H.	Rochester
Boyd, L. M.	Alexandria
Boyer, S. H., Jr.	Duluth
Boyer, S. H., Sr.	Duluth
Boynton, Ruth	Minneapolis
Boysen, Herbert	Welcome
Boysen, Peter	Pelican Rapids
Braasch, W. F.	Rochester
Bracken, H. M.	Claremont, Calif.
Brand, G. D.	St. Paul
Brand, W. A.	Redwood Falls
Branton, A. F.	Willmar
Branton, B. J.	Willmar
Bratrud, A. F.	Minneapolis
Bratrud, O. E.	Thief River Falls
Bratrude, E. J.	St. James
Braverman, N. J.	Duluth
Bray, C. W.	Biwabik
Bray, E. R.	St. Paul
Bray, P. N.	Duluth
Bregel, F. L.	St. James
Brekke, H. J.	Stillwater
Brey, F. W.	Wabasso
Briggs, J. F.	St. Paul
Brigham, C. F.	St. Cloud
Brigham, Frank	Watkins
Brink, A. A.	Baudette
Brink, J. R.	Rochester
Broders, A. C.	Rochester
Brodie, W. D.	St. Paul
Broker, W. S.	Battle Lake
Brooks, C. N.	Minneapolis
Brooks, G. F.	Stillwater
Brown, A. E.	Rochester
Brown, A. H.	Pipestone
Brown, E. D.	Minneapolis
Brown, E. I.	St. Paul
Brown, E. J.	Minneapolis
Brown, G. E.	Rochester
Brown, J. C.	St. Paul
Brown, L. L.	Crookston
Brown, P. W.	Rochester
Brown, R. W.	Cambridge
Brownstone, Manuel	Sandstone
Brunsting, L. A.	Rochester
Brusegard, J. F.	Red Wing
Brust, J. C. M.	Syracuse, N. Y.
Bryant, O. R.	Minneapolis
Buchtel, H. A.	Rochester
Buck, F. H.	Shakopee
Buie, L. A.	Rochester
Bulkley, Kenneth	Minneapolis
Bullard, Mattie J.	Minneapolis
Bullen, F. W.	Hibbing
Burch, F. E.	St. Paul
Burch, H. A.	Rochester
Burfiend, G. H.	St. Paul
Burnap, W. L.	Fergus Falls
Burns, H. A.	Ah-Gwah-Ching
Burns, H. D.	Albert Lea
Burns, M. A.	Milan
Burns, R. M.	St. Paul
Burton, C. G.	St. Paul
Buscher, J. C.	St. Cloud
Busher, H. H.	St. Paul
Butler, John	Minneapolis
Butsch, W. L.	Rochester
Butt, H. R.	Rochester
Button, A. J.	Pine River
Butturff, C. R.	Freeborn
Butz, J. A.	Triumph
Butzer, J. A.	Mankato
Buzzelle, L. K.	Minneapolis
Cable, M. L.	Minneapolis
Cabot, C. M.	Rochester
Cabot, G. S.	Minneapolis
Cahot, Hugh	Rochester
Cabot, V. S.	Minneapolis
Cady, L. H.	Minneapolis
Caine, C. E.	Morris
Caldwell, J. P.	St. Paul
Caley, G. R.	Princeton
Calhoun, F. W.	Albert Lea
Callahan, F. F.	Pokegama
Callerstrom, G. W.	Minneapolis
Cameron, Isabell	Minneapolis
Camp, J. D.	Rochester
Camp, W. E.	Minneapolis
Campbell, J. E.	So. St. Paul
Campbell, L. M.	Minneapolis
Campbell, O. J.	Minneapolis
Canfield, W. W.	Houston
Cantwell, W. F.	International Falls
Cardle, A. E.	Minneapolis
Carey, J. B.	Minneapolis
Carlaw, C. M.	Minneapolis
Carlson, C. E.	Stephen

rlson, H. A.	Minneapolis
rlson, L. A.	Rochester
rlson, Verne	Blooming Prairie
rman, J. E.	Detroit Lakes
ron, R. P.	Minneapolis
row, T. M.	Rochester
rroll, W. C.	St. Paul
rstens, C. F.	Hibbing
rter, F. G.	St. Paul
tlin, J. J.	Buffalo
tlin, T. J.	Buffalo
vanor, F. T.	Minneapolis
ervenka, C. F.	New Prague
adbourn, A. G.	Heron Lake
adbourn, C. R.	Janesville
ambers, W. C.	Blue Earth
apman, T. F.	Duluth
atterton, C. C.	St. Paul
erry, C. H.	Minneapolis
esley, A. J.	Minneapolis
ristensen, E. E.	Winona
ristenson, C. R.	Minneapolis
ristiansen, A.	St. Paul
ristianson, H. W.	Minneapolis
hristie, G. R.	Long Prairie
hristie, R. L.	Long Prairie
hristison, J. T.	St. Paul
lark, H. S.	Minneapolis
lark, L. W.	Spring Valley
lark, T. C.	Minneapolis
lay, F. H.	St. Charles
laydon, D. R.	Red Wing
aydon, H. F.	Zumbrota
laydon, L. E.	Red Wing
lement, J. B.	Lester Prairie
lement, T. G.	Duluth
lifford, G. W.	Osakis
oate, J. D.	Rochester
ochrane, W. J.	Lake City
offey, R. J.	Rochester
ohen, S. S.	Oak Terrace
olby, Woodard	St. Paul
ole, H. B.	Redwood Falls
ole, J. G.	Redwood Falls
ole, W. H.	St. Paul
ollie, H. G.	St. Paul
ollins, A. N.	Duluth
ollins, D. C.	Los Angeles, Calif.
ollins, H. C.	Duluth
ollins, J. S.	Wabasha
olvin, A. R.	St. Paul
ombacker, L. C.	Fergus Falls
omfort, M. W.	Rochester
ondit, W. H.	Minneapolis
onner, H. M.	St. Paul
onnor, C. E.	Rochester
ook, E. N.	Rochester
ook, H. W.	Minneapolis
ook, J. M.	Staples
ooney, H. C.	Princeton
ooper, M. D.	Winnebago
ooperman, H. O.	Minneapolis
orbett, J. F.	Minneapolis
orniea, A. D.	Minneapolis
orrigan, J. E.	Spooner
osgriff, J. A.	Bird Island
osman, E. O.	Minneapolis
ostello, R. T.	Rochester
ottam, G. G.	Minneapolis
ounseller, V. S.	Rochester
ountryman, R. S.	St. Paul
ovell, W. W.	St. Peter
oventry, W. A.	Duluth
owern, E. W.	North St. Paul
rafts, L. M.	Minneapolis
ragg, R. W.	Rochester
raig, C. C.	International Falls
raig, W. McK.	Rochester
ranmer, R. R.	Minneapolis
ranston, R. W.	St. Louis Park
reevy, C. D.	Minneapolis
remer, P. H.	Hastings
renshaw, J. L.	Rochester
ress, E. E.	Boyd
ress, P. J.	Ellsworth
rewe, J. E.	Rochester
ritchfield, L. R.	St. Paul
ronwell, B. J.	Austin
row, E. R.	Arlington
ulligan, J. M.	St. Paul
ulver, L. G.	Thief River Falls
umming, J. F.	Morris
urry, F. S.	Detroit, Mich.
urtin, J. F.	Minneapolis
urtis, R. A.	Le Center
utts, George	Minneapolis
utts, R. E.	Minneapolis

ack, L. G.	St. Paul
ady, E. E.	Minneapolis
ahl, E. O.	Minneapolis
ahl, G. A.	Mankato
ahl, J. A.	Minneapolis
aignault, Oscar	Benson
aniel, D. H.	Minneapolis
Daniel, L. M.	Minneapolis
Danielson, K. A.	Litchfield
Danielson, Lennox	Litchfield
Darling, J. B.	St. Paul
Dart, L. O.	Minneapolis
Daugherty, E. B.	St. Paul
Daugherty, L. E.	St. Paul
Davenport, L. H.	Rochester
Davis, A. C.	Rochester
Davis, B. F.	Duluth
Davis, F. U.	Faribault
Davis, Herbert	St. Paul
Davis, I. G.	Rushford
Davis, J. C.	Minneapolis
Davis, L. T.	Wadena
Davis, P. L.	Rochester
Davis, T. C.	Wadena
Davis, William	St. Paul
Deacon, A. E.	Rochester
DeBoer, Hermanus	Edgerton
Dedolph, Karl	St. Paul
Dedolph, T. H.	Braham
Deissler, K. J.	Oakland, Calif.
Delmore, J. L.	Roseau
del Plaine, C. W.	Minneapolis
Demo, P. W.	Wells
Denman, A. V.	Mankato
Derauf, B. I.	St. Paul
Desjardins, A. U.	Rochester
Devereaux, T. J.	Wayzata
Dewey, D. H.	Owatonna
Dickson, T. H., Jr.	St. Paul
Diehl, H. S.	Minneapolis
Diessner, H. D.	Minneapolis
Dittman, G. C.	St. Paul
Dixon, C. F.	Rochester
Dolan, C. P.	Worthington
Dolder, F. C.	Eyota
Doleman, N. F.	Tintah
Doms, H. C.	Slayton
Donaldson, C. A.	Mesa, Arizona
Donohue, P. F.	St. Paul
Doolittle, L. E.	Duluth
Dordal, J.	Sacred Heart
Dorge, R. I.	Minneapolis
Dornblaser, H. B.	Minneapolis
Dorsey, G. C.	Minneapolis
Dorsey, J. M.	Rochester
Dovre, C. M.	St. Paul
Dowswell, W. J.	Kerkhoven
Doxey, G. L.	Minneapolis
Doyle, G. C.	Duluth
Doyle, L. O.	Minneapolis
Drake, C. B.	St. Paul
Drake, C. R.	Minneapolis
Drake, F. A.	Lanesboro
Dredge, H. P.	Sandstone
Drenning, F. C.	Duluth
Drill, H. E.	Hopkins
Drips, Della G.	Rochester
Drought, W. W.	Fergus Falls
Dry, T. J.	Rochester
Dubbe, F. H.	New Ulm
DuBois, J. A.	Sauk Center
DuBois, J. F.	Sauk Center
Dudley, J. H.	Windom
Duff, E. R.	Minneapolis
Dugan, L. F.	Faribault
Dulude, S. S.	Dassel
Dumas, A. G.	Minneapolis
Duncan, J. W.	Moorhead
Dungay, N. S.	Northfield
Dunlap, E. H.	Minneapolis
Dunn, G. R.	Minneapolis
Dunn, J. N.	St. Paul
Durgin, F. L.	Winnebago
Duryea, Marbry	Minneapolis
Duryea, W. M.	Minneapolis
Dutton, C. E.	Minneapolis
Dvorak, B. A.	Minneapolis
Dwan, P. F.	Minneapolis
Dworsky, S. D.	Minneapolis
Dysterheft, A. F.	Gaylord

Earl, G. A.	St. Paul
Earl, R. O.	St. Paul
Eaton, L. McK.	Rochester
Eberlin, E. A.	Glenwood
Eckman, P. F.	Duluth
Eckman, R. J.	Duluth
Edlund, G.	St. Paul
Edward, George	Canton
Edwards, G. C.	Grove City
Edwards, R. T.	Elysian
Ehrenberg, C. J.	Minneapolis
Ehrlich, S. P.	Minneapolis
Eich, Matthew	Minneapolis
Eisenstadt, D. H.	Minneapolis
Eitel, G. D.	Minneapolis
Ekblad, J. W.	Duluth
Eklund, E. J.	Norwood
Elias, F. J.	Duluth
Ellingson, A. R.	Detroit Lakes
Ellison, D. E.	Minneapolis
Ellison, F. E.	Monticello
Elsey, E. McC.	Glenwood
Elsey, J. R.	Glenwood
Ely, O. S.	South St. Paul
Emanuel, K. W.	Duluth
Emerson, E. C.	St. Paul
Emmerson, W. S.	Mayer
Emmett, J. L.	Rochester
Endress, E. K.	St. Paul
Engberg, E. J.	St. Paul
Engh, Sigfred	Jackson
Engstrand, O. J.	Minneapolis
Engstrom, F. A.	Wanamingo
Engstrom, G. F.	Belgrade
Eppard, R. M.	Cloquet
Erb, F. A.	Minneapolis
Erdmann, C. A.	Minneapolis
Erickson, Eskil	Halstad
Erickson, R. F.	Minneapolis
Ericson, R. M.	Minneapolis
Ericson, Swan	Le Sueur
Ernest, G. C.	St. Paul
Ertel, E. G.	Ellendale
Eshelby, E. C.	St. Paul
Esser, John	Perham
Estrem, C. O.	Fergus Falls
Eusterman, G. B.	Rochester
Evans, E. T.	Minneapolis
Evans, R. D.	Minneapolis
Evarts, A. B.	Rochester
Ewald, R. P.	Newport
Ewens, H. B.	Virginia
Ewing, C. F.	Wheaton
Exley, E. W. F.	Minneapolis

Faber, J. E.	Rochester
Fahey, E. W.	St. Paul
Fahr, G. E.	Minneapolis
Fansler, W. A.	Minneapolis
Farabaugh, C. L.	Minneapolis
Farrish, R. C.	Sherburn
Fasbender, H. A.	Hastings
Fatherree, T. J., Jr.	Rochester
Fawcett, A. M.	Renville
Fawcett, C. E.	Duluth
Fawcett, K. R.	Stewartville
Feeney, J. M.	Minneapolis
Fellows, M. F.	Duluth
Fenger, E. P. K.	Oak Terrace
Ferguson, J. C.	St. Paul
Fesler, H. H.	St. Paul
Fetterly, Warren	Minneapolis
Feuling, John	Bovey
Fiala, M. J.	Duluth
Figi, F. A.	Rochester
Fiksdal, M. J.	Willmar
Fine, B. A.	Winsted
Fink, L. W.	Minneapolis
Fink, W. H.	Minneapolis
Fischer, H. P.	Shakopee
Fischer, M. McC.	Duluth
Fischer, P. M.	Shakopee
Fisher, Laura M.	Rochester
Fitzgerald, D. F.	Minneapolis
Fitzgerald, E. T.	Morris
Fjeldstad, C. A.	Minneapolis
Flanagan, H. F.	St. Paul
Flanagan, L. G.	Austin
Flancher, L. H.	Lake Park
Fleischhauer, D. S.	Wabasha
Flesche, B. A.	Lake City
Flinn, T. E.	Redwood Falls
Flores, O. T.	Dodge Center
Fogarty, C. W.	St. Paul
Fogelberg, E. J.	St. Paul
Foley, F. E. B.	St. Paul
Foley, M. P.	Rochester
Folken, F. G.	Albert Lea
Folta, John	Ceylon
Ford, B. C.	Marshall
Ford, W. H.	Minneapolis
Foshager, H. T.	Clara City
Foster, F. P.	Rochester
Foster, R. F.	Rochester
Foster, W. K.	Minneapolis
Fowler, L. H.	Minneapolis
Franchere, F. W.	Lake Crystal
Francis, D. W.	Faribault
Frary, Louise G.	Minneapolis
Fredericks, G. M.	Minneapolis
Fredrickson, Alice C.	Lake Lillian
Fredrickson, G. U. Y.	Lake Lillian
Freeman, C. D.	St. Paul
Freeman, G. H.	St. Peter
Freeman, J. P.	Albert Lea
Freeman, W. L.	St. Cloud
Freligh, W. P.	Albert Lea
Fricke, R. E.	Rochester
Friedell, Aaron	Minneapolis
Friesleben, William	Sauk Rapids
Frisch, F. P.	Willmar
Fritsche, Albert	New Ulm
Fritsche, C. J.	New Ulm
Froats, C. W.	Thief River Falls

Froehlich, H. W.	Minneapolis
Frost, E. H.	Willmar
Frost, H. T.	Wadena
Frost, R. H.	Wabasha
Fugina, G. R.	Mankato
Funk, V. K.	Oak Terrace

Gaarde, F. W.	Rochester
Gager, E. C.	St. Paul
Gaines, E. C.	Buffalo Lake
Gallagher, B. J.	Waseca
Gamble, J. W.	Albert Lea
Gamble, P. M.	Albert Lea
Gammell, J. H.	Minneapolis
Garbrecht, Arthur	St. Paul
Gardiner, D. G.	St. Paul
Gardner, E. L.	Minneapolis
Gardner, V. H.	Fairmont
Gardner, W. P.	Hastings
Garling, I. C.	Rochester
Garlock, A. V.	Bemidji
Garlock, D. H.	Bemidji
Garrow, D. M.	Ely
Gates, C. E.	Anoka
Geer, E. K.	St. Paul
Gehlen, J. N.	St. Paul
Geist, G. A.	St. Paul
Gelz, J. J.	St. Cloud
Gerber, M. P.	Brainerd
Germo, Charles	Balaton
Ghent, C. H.	St. Paul
Ghent, M. M.	St. Paul
Ghormley, R. K.	Rochester
Ghostley, Mary C.	Puposky
Gibbons, F. C.	Comfrey
Giere, E. O.	Minneapolis
Giere, J. C.	Minneapolis
Giere, R. W.	Minneapolis
Giere, S. W.	Benson
Giesen, A. F.	Starbuck
Giessler, P. W.	Minneapolis
Giffin, H. Z.	Rochester
Gifford, B. L.	Hewitt
Gilfillan, J. S.	St. Paul
Gilles, F. L.	Minneapolis
Gillespie, D. L.	Rochester
Gillespie, M. G.	Duluth
Gillespie, N. H.	Duluth
Gilpin, S. F., Jr.	Rochester
Gingold, B. A.	Minneapolis
Ginsberg, S. T.	St. Paul
Ginsberg, William	St. Paul
Goblirsch, A. P.	Sleepy Eye
Goehrs, H. W.	St. Cloud
Golden, C. M.	Tyler
Goldsmith, Grace A.	Rochester
Goltz, E. V.	St. Paul
Goodwin, T. W.	Rochester
Gosslee, G. L.	Moorhead
Gowan, L. R.	Duluth
Graham, Robert	Duluth
Grant, H. W.	St. Paul
Gratzek, F. R.	Minneapolis
Gratzek, Thomas	St. Paul
Grave, Floyd	Minneapolis
Graves, W. N.	Duluth
Grawn, F. A.	Northome
Gray, F. D.	Marshall
Gray, H. K.	Rochester
Gray, R. C.	Minneapolis
Green, E. K.	Minneapolis
Greene, H. H.	Austin
Greene, W. P.	Minneapolis
Greisheimer, Esther M.	Minneapolis
Griffin, A. M.	Rochester
Griffin, P. J.	Fertile
Grimes, H. B.	Madelia
Grimes, Marian	Minneapolis
Grise, W. B.	Austin
Grogan, J. S.	Wadena
Gronvall, P. R.	Minneapolis
Groschupf, T. P.	Bemidji
Grose, F. N.	Clarissa
Gruenhagen, A. P.	St. Paul
Grundset, O. J.	Montrose
Gullixson, A.	Albert Lea
Gully, R. J.	St. Peter
Gunderson, N. A.	Minneapolis
Gustafson, H. T.	Minneapolis
Guthrie, J. S.	Rochester

Habein, H. C.	Rochester
Haberman, Emil	Osakis
Hacking, F. H.	Minneapolis
Haes, J. E.	Vernon Center
Haessly, S. B.	Faribault
Hagaman, G. K.	St. Paul
Hagen, O. E.	Butterfield
Hagen, O. J.	Moorhead
Hagen, G. L.	Minneapolis
Haggard, G. D.	Minneapolis
Haight, G. G.	Audubon
Haines, J. H.	Stillwater
Haines, S. F.	Rochester
Hale, D. E.	Rochester
Hall, A. R.	St. Paul
Hall, H. H.	St. Paul
Hall, J. M.	Minneapolis
Hallberg, C. A.	Minneapolis
Hallenbeck, D. F.	Rochester
Halloran, W. H.	Jackson
Halpern, D. J.	Brewster
Halpin, J. E.	Rush City
Hamel, A. L.	Minneapolis
Hamilton, Angie G. S.	Northfield
Hamilton, A. S.	Minneapolis
Hamilton, W. S.	Cincinnati, Ohio
Hamlin, G. B.	Minneapolis
Hammes, E. M.	St. Paul
Hammermeister, T. F.	New Ulm
Hammond, J. F.	St. Paul
Hand, R. O.	Minneapolis
Hand, W. R.	Elbow Lake
Haney, C. L.	Duluth
Hannah, H. B.	Minneapolis
Hanover, R. D.	Littlefork
Hansen, E. W.	Minneapolis
Hansen, Marius	Ada
Hansen, Olga S.	Minneapolis
Hansen, Rorbye	Monticello
Hanson, A. M.	Faribault
Hanson, E. C.	Park Rapids
Hanson, E. C.	New York Mills
Hanson, H. J.	Minneapolis
Hanson, H. V.	Minneapolis
Hanson, W. A.	Minneapolis
Happe, L. J.	Marshall
Hardwick, R. S.	Rochester
Harmon, G. E.	St. Paul
Harriman, L.	Howard Lake
Harrington, C. D.	Minneapolis
Harrington, F. E.	Minneapolis
Harrington, S. W.	Rochester
Harris, C. N.	Nashwauk
Harrison, P. W.	Worthington
Harrison, W. C.	Minneapolis
Hart, V. L.	Minneapolis
Hart, W. E.	Monticello
Hartfiel, W. F.	St. Paul
Hartley, E. C.	St. Paul
Hartman, H. R.	Rochester
Hartung, E. H.	Claremont
Hartzell, T. B.	Minneapolis
Haskell, A. D.	Alexandria
Hassett, R. G.	Mankato
Hastings, D. R.	Minneapolis
Hatch, W. E.	Duluth
Hathaway, S. J.	Procter
Hauge, M. I.	Clarkfield
Hauge, M. M.	Clarkfield
Haugen, J. A.	Minneapolis
Haugseth, Enoch	Twin Valley
Hauser, V. P.	St. Paul
Havel, H. W.	Shakopee
Havens, F. Z.	Rochester
Havens, J. G. W.	Austin
Haverfield, Addie R.	Minneapolis
Hawkins, V. J.	St. Paul
Hawkinson, J. P.	Crosby
Hawkinson, L. F.	Brainerd
Hawkinson, R. P.	Robbinsdale
Hayes, J. M.	Minneapolis
Hayes, M. F.	Nashwauk
Haynes, A. L.	Faribault
Haynes, B. H.	Lewisville
Head, D. P.	Minneapolis
Head, G. D.	Minneapolis
Healy, R. T.	Pierz
Heath, A. C.	Stillwater
Hebeisen, M. B.	Chaska
Hebert, W. H. J.	Rochester
Heck, F. J.	Rochester
Heck, W. W.	St. Paul
Hedback, A. E.	Minneapolis
Hedberg, G. A.	Nopeming
Hedenstrom, F. G.	St. Paul
Hedenstrom, L. H.	Cambridge
Hedin, R. F.	Red Wing
Hegge, O. H.	Austin
Hegge, R. S.	Austin
Heiam, W. C.	Cook
Heiberg, E. A.	Fergus Falls
Heilman, F. R.	Rochester
Heimark, J. J.	Fairmont
Heimark, O. E.	Duluth
Heise, W. F. C.	Winona
Helk, H. H.	Minneapolis
Helland, G. M.	Spring Grove
Helland, J. W.	Spring Grove
Helmholz, H. F.	Rochester
Hempstead, B. E.	Rochester
Hemstead, Werner	St. Cloud
Hench, P. S.	Rochester
Henderson, A. J.	Kiester
Henderson, M. S.	Rochester
Hendrickson, J. F.	Minneapolis
Hendrickson, R. R.	Wadena
Hengstler, W. H.	St. Paul
Henney, W. H.	McIntosh
Henriksen, H. G.	Elk
Henrikson, E. C.	Minneapoli
Henry, C. E.	Minneapoli
Henry, M. O.	Minneapoli
Hensel, C. N.	St. Pau
Henslin, A. E.	Le Ro
Herbert, W. L.	Maynar
Herbolsheimer, A. J.	Minneapolis
Herman, A. L.	Minneapolis
Hermanson, P. E.	Hendricks
Heron, R. C.	St. Pau
Herrell, W. E.	Rochester
Herrmann, E. T.	St. Pau
Hertel, G. E.	Austin
Hertzog, A. J.	Rochester
Hesdorffer, M. B.	Minneapolis
Heseltine, V. G.	Taylors Falls
Hesselgrave, S. S.	St. Paul
Hewitt, Edith S.	Rochester
Hewitt, R. M.	Rochester
Heyerdale, O. C.	Rochester
Hiebert, J. P.	Minneapolis
Higgins, J. H.	Minneapolis
Higgs, W. W.	Park Rapids
Hilding, A. C.	Duluth
Hilger, A. W.	St. Paul
Hilger, D. D.	St. Paul
Hilger, L. A.	St. Paul
Hill, Eleanor J.	Minneapolis
Hill, F. E.	Duluth
Hines, E. A., Jr.	Rochester
Hiniker, L. P.	St. Paul
Hiniker, P. J.	Le Sueur
Hinshaw, H. C.	Rochester
Hirschboeck, F. J.	Duluth
Hirschfelder, A. D.	Minneapolis
Hirschfield, M. S.	Duluth
Hirshfield, F. R.	Minneapolis
Hitchings, W. S.	Lakefield
Hoaglund, A. W.	Minneapolis
Hobbs, C. A.	Minneapolis
Hockfilzer, J. J.	St. Paul
Hodapp, R. J.	Willmar
Hodge, S. V.	Minneapolis
Hodgson, C. H.	Fergus Falls
Hoerner, M. T.	Rochester
Hoff, Alfred	St. Paul
Hoffert, H. E.	Minneapolis
Hoffman, M. H.	St. Paul
Hoidale, A. D.	Tracy
Holbrook, J. S.	Mankato
Holcomb, J. T.	St. Paul
Holcomb, O. W.	St. Paul
Holl, P. M.	Minneapolis
Hollands, W. H.	Fisher
Holm, H. H.	Glencoe
Holm, P. F.	Wells
Holmberg, L. J.	Canby
Holmen, R. W.	St. Paul
Holmes, A. E.	Rush City
Holmstrom, C. H.	Warren
Holst, C. F.	Little Falls
Holst, J. B.	Little Falls
Holt, G. W.	Ely
Holt, J. E.	St. Paul
Holt, W. B.	Minneapolis
Holtan, Theodore	Waterville
Holte, Halvor	Crookston
Horton, B. T.	Rochester
Hospodarsky, L. J.	New Prague
Hottinger, R. C.	Janesville
House, Z. E.	Cass Lake
Houston, C. A.	Park Rapids
Hovde, Rolf	Winthrop
Howard, M. A.	St. Paul
Howard, M. I.	Mankato
Howard, W. H.	Minneapolis
Howard, W. S.	St. Paul
Howell, L. P.	Rochester
Hoyer, L. J.	Howard Lake
Hubbard, O. E.	Brainerd
Hubin, E. G.	Deerwood
Hubly, J. W.	Rochester
Huenekens, E. J.	Minneapolis
Huffington, H. L.	Mankato
Hughes, L. D.	Minneapolis
Hullsiek, R. B.	St. Paul
Hultkrans, J. C.	St. Paul
Hultkrans, R. E.	Minneapolis
Humphrey, E. W.	Moorhead
Humphrey, W. R.	Stillwater
Hunt, A. B.	Rochester
Hunt, R. C.	Fairmont
Hunte, A. F.	Bylas, Arizona
Hurd, Annah	Minneapolis
Husband, M. W.	Minneapolis
Hutchinson, C. J.	Minneapolis
Hutchinson, Henry	Willmar
Huxley, F. R.	Faribault
Hymes, Charles	Minneapolis
Hynes, J. E.	Minneapolis

Ide, A. W.	St. Paul
Ikeda, Kano	St. Paul

ngebrigtson, E. K.	Moorhead
rvine, H. G.	Minneapolis
rwin, A. F.	Minneapolis

ackson, C. M.	Minneapolis
acobs, A. C.	Elmore
acobs, G. C.	Fergus Falls
acobs, J. C.	Willmar
acobson, Clarence	Chisholm
acobson, D. J.	Blackduck
acquot, G. L.	Marshall
amieson, Earl	Walnut Grove
ennings, F. L.	Oak Terrace
ennings, Mary H.	Minneapolis
ensen, A. H.	Hutchinson
ensen, Harry	Minneapolis
ensen, H. H.	Atwater
ensen, M. J.	Minneapolis
ensen, T. J.	Duluth
ohanson, W. G.	St. Paul
ohnson, A. B.	Minneapolis
ohnson, A. E.	Minneapolis
ohnson, A. E.	Red Wing
ohnson, A. M.	St. Paul
ohnson, C. E.	Cambridge
ohnson, C. M.	Dawson
ohnson, E. W.	Bemidji
ohnson, Hans	Kerkhoven
ohnson, H. A.	Minneapolis
Johnson, H. M.	Dawson
Johnson, H. P.	Fairmont
Johnson, Julius	Minneapolis
Johnson, J. A.	Minneapolis
Johnson, J. A.	St. Paul
Johnson, N. A.	Minneapolis
Johnson, Norman	Minneapolis
Johnson, O. H.	Redwood Falls
Johnson, O. V.	Fergus Falls
Johnson, R. A.	Minneapolis
Johnson, R. B.	Lanesboro
Johnson, R. E.	Worthington
Johnson, R. G.	St. Paul
Johnson, S. M.	Minneapolis
Johnson, T. H.	San Francisco, Calif.
Johnson, V. P.	Delano
Johnson, Walfred	Sauk Center
Johnson, W. E.	Morgan
Johnson, Y. T.	Minneapolis
Johnston, L. F.	Minneapolis
Jolin, F. M.	Grand Rapids
Jolin, R. V.	Lake Park
Jones, A. W.	Red Wing
Jones, D. C.	St. Paul
Jones, E. M.	St. Paul
Jones, G. M.	Minneapolis
Jones, H. M.	Rochester
Jones, H. W.	Minneapolis
Jones, R. N.	St. Cloud
Jones, W. R.	Minneapolis
Jordan, L. S.	Granite Falls
Josewich, Alexander	Minneapolis
Josewski, R. J.	Stillwater
Joyce, G. T.	Rochester
Judd, E. S.	Rochester
Juergens, H. M.	Belle Plaine
Juers, E. H.	Red Wing
Juliar, R. O.	St. Clair
Just, H. J.	Lafayette

Kaasa, L. J.	Albert Lea
Kadesky, David	St. Paul
Kalin, O. T.	Minneapolis
Kalinoff, D.	Stillwater
Kamman, G. R.	St. Paul
Kamp, B. A.	Albert Lea
Kannary, E. L.	St. Paul
Kanne, C. W.	Faribault
Kaplan, D. H.	St. Paul
Karleen, P. E.	Deer River
Karn, B. R.	Ortonville
Kasper, E. M.	St. Paul
Kaufman, W. C.	Appleton
Keith, N. M.	Rochester
Kelby, G. M.	Minneapolis
Kelling, L. F.	Lakefield
Kelly, B. W.	Aitkin
Kelly, J. V.	St. Paul
Kelly, P. H.	St. Paul
Kelsey, C. G.	Hinckley
Kemp, M. W.	Fergus Falls
Kenefick, E. V.	St. Paul
Kennedy, C. C.	Minneapolis
Kennedy, Jane F.	Minneapolis
Kennedy, R. L. J.	Rochester
Kennedy, R. R.	Minneapolis
Kennedy, W. A.	St. Paul
Kepler, E. J.	Rochester
Kerlan, S. Z.	Aitkin
Kernohan, J. W.	Rochester
Kerschbaumer, Louisa	St. Peter
Kertesz, G.	Minneapolis
Kesting, Herman	St. Paul
Kettlewell, R. B.	Sauk Center
Keyes, C. R.	Duluth
Keyes, J. D.	Winona
Kibbe, O. A.	Minneapolis
Kierland, P. E.	Alexandria
Kilbride, E. A.	Worthington
Kilbride, J. S.	Canby
King, E. A.	Minneapolis
King, G. L.	St. Paul
King, H. T.	Minneapolis
King, Z. P.	St. Paul
Kinsella, T. J.	Oak Terrace
Kirk, G. P.	East Grand Forks
Kirklin, B. R.	Rochester
Kirklin, O. L.	Rochester
Kistler, A. J.	Minneapolis
Kistler, C. M.	Minneapolis
Klaveness, E.	St. Paul
Klein, Harry	Duluth
Klein, H. N.	St. Paul
Klima, W. W.	Stewart
Kling, F. L.	Milaca
Knapp, F. N.	Duluth
Knapp, M. E.	Minneapolis
Knauff, M. K.	St. Paul
Knepper, P. A.	Rochester
Knight, R. R.	Minneapolis
Knight, R. T.	Minneapolis
Knutson, G. A.	Greenbush
Koelsche, G. A.	Rochester
Koenigsberger, Charles	Mankato
Koepcke, G. M.	Minneapolis
Kohlbry, C. O.	Duluth
Kohler, D. W.	St. Joseph
Kolars, J. J.	Le Center
Koller, H. M.	Minneapolis
Koller, L. R.	Minneapolis
Kolset, C. D.	Sanborn
Kooiker, H. J.	Milaca
Koop, S. H.	Richmond
Kotchevar, F. R.	Eveleth
Kraft, Peter	Duluth
Krantz, C. I.	Duluth
Kreuzer, T. C.	Owatonna
Kroeze, R. G.	Rochester
Kroning, C. G.	St. Charles
Kucera, F. J.	Hopkins
Kucera, S. T.	Lonsdale
Kucera, W. J.	Minneapolis
Kugler, A. A.	St. Paul
Kuhlmann, August	Melrose
Kuske, A. W.	Faribault
Kusske, A. L.	New Ulm
Kuth, J. R.	Duluth
Kvale, W. F.	Rochester
Kvitrud, Gilbert	St. Paul

Laird, A. T.	Nopeming
Lajoie, J. M.	Minneapolis
Lamb, H. L.	Little Falls
Laney, R. L.	Fertile
Langenderfer, F. V.	St. Paul
Langhoff, A. H.	Glencoe
Lannin, J. C.	Mabel
Lapierre, A. P.	Minneapolis
Lapierre, C. A.	Minneapolis
Lapierre, J. T.	Minneapolis
Larsen, C. L.	St. Paul
Larsen, F. W.	Minneapolis
Larsen, O. O.	Detroit Lakes
Larson, Arnold	Detroit Lakes
Larson, C. M.	Minneapolis
Larson, J. T.	Lake Wilson
Larson, L. J.	Bagley
Larson, L. M.	Minneapolis
Larson, L. M.	Oak Terrace
Larson, P. N.	Minneapolis
Laughlin, J. T.	Grey Eagle
Laurent, A. A.	Minneapolis
LaVake, R. T.	Minneapolis
Lax, M. H.	St. Paul
Lazar, H. L.	Minneapolis
Leahy, Bartholomew	St. Paul
Leavenworth, R. O.	St. Paul
Leavitt, H. H.	Minneapolis
Lebowske, J. A.	Minneapolis
Leck, P. C.	Austin
Leddy, E. T.	Rochester
Lee, H. M.	Minneapolis
Lee, J. L.	Watertown
Lee, W. A.	Fergus Falls
Lee, W. N.	Madison
Leibold, H. H.	Parkers Prairie
Leitch, Archibald	St. Paul
Leitch, N. M.	Warroad
Leland, H. R.	Minneapolis
Leland, J. T.	Herman
Lemon, W. S.	Rochester
Lenander, M. E.	St. Peter
Lende, Norman	Faribault
Lendrum, F. C.	Madison, Wis.
Lenont, C. B.	Virginia
Lenton, H. P.	Rochester
Lenz, O. A.	Minneapolis
Leonard, G. J.	St. Paul
Leopard, B. A.	Albert Lea
Lepak, F. J.	Duluth
Lepak, J. A.	St. Paul
Lerche, William	Cable, Wis.
Leser, R. U.	Rochester
Leven, N. L.	St. Paul
Levin, Bert	St. Paul
Levine, N. M.	Minneapolis
Lewis, A. J.	Henning
Lewis, C. B.	St. Cloud
Lewis, W. W.	St. Paul
Lexa, F. J.	Lonsdale
Libert, J. N.	St. Cloud
Lichtenstein, H.	Winona
Lick, C. L.	St. Paul
Liedloff, A. G.	Mankato
Liffrig, W. W.	Goodhue
Lightbourn, E. T.	Jordan
Lillehei, E. J.	Robbinsdale
Lillie, H. I.	Rochester
Lima, Ludvig	Montevideo
Lind, C. J.	Minneapolis
Lindahl, M. J.	Jasper
Lindberg, A. L.	Wheaton
Linde, Herman	Cyrus
Lindquist, R. H.	Minneapolis
Lindsay, W. V.	Winona
Linner, Gunnar	Stillwater
Linner, H. P.	Minneapolis
Linton, W. B.	Minneapolis
Lippman, H. S.	St. Paul
Lippmann, E. W.	Hutchinson
Lipschultz, Oscar	Minneapolis
Litman, A. B.	Minneapolis
Litman, S. N.	Duluth
Little, W. J.	St. Paul
Litzenberg, J. C.	Minneapolis
Livingstone, J. W.	Hudson
Lloyd, H. J.	Mankato
Lochead, D. C.	Rochester
Locken, O. E.	Crookston
Loenholdt, E. H.	Hector
Logan, A. H.	Rochester
Logan, F. W.	Blue Earth
Logefeil, R. C.	Minneapolis
Lommen, P. A.	Austin
Long, Jesse	Minneapolis
Loofbourrow, E. H.	Keewatin
Loomis, E. A.	Minneapolis
Love, F. A.	Carlos
Love, J. G.	Rochester
Lowe, E. R.	So. St. Paul
Lowe, Thomas	Pipestone
Lowe, T. A.	St. Paul
Luden, Georgine	Victoria, B. C., Can.
Luedtke, G. H.	Fairmont
Lufkin, C. D.	Northfield
Lum, C. E.	Nisswa
Lund, C. J. T.	Underwood
Lundblad, R. A.	Minneapolis
Lundgren, A. C.	Minneapolis
Lundholm, A. M.	St. Paul
Lundquist, E. F.	Minneapolis
Lundy, J. S.	Rochester
Lynch, F. W.	St. Paul
Lynch, M. J.	Minneapolis
Lynde, O. G.	Thief River Falls
Lynn, J. F.	Waseca
Lyon, E. P.	Minneapolis
Lysne, Henry	Minneapolis

Macbeth, J. L.	St. Clair
MacDonald, A. E.	Minneapolis
MacDonald, D. A.	Minneapolis
MacDonald, I. C.	Minneapolis
Macey, H. B.	Rochester
Mach, F. B.	Minneapolis
Mack, J. I.	Fordyce, Arkansas
Macklin, W. E., Jr.	Litchfield
Macnie, J. S.	Minneapolis
MacRae, G. C.	Duluth
Madden, J. F.	St. Paul
Madland, R. S.	Fairfax
Maertz, W. F.	New Prague
Magath, T. B.	Rochester
Magee, H. R.	Los Angeles, Calif.
Magiera, Estelle A.	Rochester
Magney, F. H.	Duluth
Mahowald, A.	Albany
Maisel, J. J.	New York, N. Y.
Maitland, D. P.	Jackson
Maland, C. O.	Minneapolis
Malerich, J. A.	Caledonia
Malmstrom, J. A.	Virginia
Manley, L. V.	Albert Lea
*Mann, A. T.	Minneapolis
Mann, F. C.	Rochester
Manson, F. M.	Worthington
Marble, W. P.	Rochester
Marcley, W. J.	Minneapolis
Marcum, E. H.	Bemidji
Mariette, E. S.	Oak Terrace
Mark, D. B.	Minneapolis
Mark, Hilbert	Ah-Gwah-Ching

---

*Deceased.

Markoe, J. C.	St. Paul
Martin, E. T.	Duluth
Martin, T. P.	Arlington
Martin, W. C.	Duluth
Martineau, J. L.	St. Paul
Martinson, C. J.	Wayzata
Mass, Max	Cold Spring
Masson, D. M.	Rochester
Masson, J. C.	Rochester
Matchan, G. R.	Minneapolis
Matthews, Justus	Minneapolis
Mattill, P. M.	Oak Terrace
Mattison, P. A.	Winona
Mattson, C. H.	St. Paul
Mattson, Hamlin	Minneapolis
Maxeiner, S. R.	Minneapolis
May, W. H.	Minneapolis
Mayland, M. L.	Faribault
Mayne, R. M.	Duluth
Mayo, C. H.	Rochester
Mayo, C. W.	Rochester
Mayo, J. G.	Rochester
Mayo, W. J.	Rochester
Maytum, C. K.	Rochester
McBroom, D. E.	Cambridge
McCarthy, Donald	Minneapolis
McCarthy, J. J.	St. Paul
McCarthy, W. J.	Madelia
McCarthy, W. R.	St. Paul
McCartney, J. S.	Minneapolis
McCarty, P. D.	Ely
McCarty, W. C.	Rochester
McClanahan, J. H.	White Bear
McClanahan, T. S.	White Bear
McCloud, C. N.	St. Paul
McComb, C. F.	Duluth
McCormack, C. J.	Rochester
McCoy, Mary K.	Duluth
McCrea, J. M.	Fulda
McDaniel, Orianna	Minneapolis
McDaniel, S. P.	Mountain Iron
McDonald, A. L.	Duluth
McDonald, J. R.	Rochester
McDowell, J. P.	St. Cloud
*McEachran, A.	Minneapolis
McEnaney, C. T.	Owatonna
McFarland, A. H.	Minneapolis
McGandy, R. F.	Minneapolis
McGeary, G. E.	Minneapolis
McGowan, J. M.	Rochester
McGroarity, J. J.	Easton
McGuigan, H. T.	Red Wing
McHugh, R. F.	Aitkin
McInerney, Maurice	Minneapolis
McIntyre, George	Minneapolis
McIntyre, J. A.	Owatonna
McIntire, H. M.	Waseca
McIver, B. A.	Lowry
McKaig, C. B.	Pine Island
McKechnie, R. E.	Rochester
McKenna, J. K.	Austin
McKenna, M. J.	Graceville
McKeon, J. O.	Montgomery
McKeon, Owen	St. Paul
McKeown, E. G.	Pipestone
McKinlay, C. A.	Minneapolis
McKinley, J. C.	Minneapolis
McKinney, F. S.	Minneapolis
McLane, Evelyn G.	Jackson
McLane, W. O.	Jackson
McLaren, Jeanette M.	St. Paul
McLaughlin, E. M.	Winona
McMahon, M. J.	Green Isle
McNevin, C. F.	St. Paul
McNutt, J. R.	Duluth
McPheeters, H. O.	Minneapolis
McQuarrie, Irvine	Minneapolis
McTamaney, R. A.	Rochester
Mead, C. H.	Duluth
Mead, N. C.	Coleraine
Meade, J. R.	St. Paul
Mears, B. J.	St. Paul
Meckstroth, C. W.	Brandon
Medelman, J. P.	Minneapolis
Mee, P. H.	Osseo
Meinert, A. E.	Winona
Meland, E. L.	Minneapolis
Melby, Benedik	Blooming Prairie
Mellby, O. F.	Thief River Falls
Melzer, G. R.	Lyle
Mercil, W. F.	Crookston
Merkert, C. E.	Minneapolis
Merkert, G. L.	Minneapolis
Merrill, Elizabeth	Minneapolis
Merriman, L. L.	Duluth
Merrit, W. A.	Albert Lea
Mesker, G. H.	Olivia
Meyer, A. A.	Melrose
Meyer, E. L.	Minneapolis
Meyer, F. C.	Kenyon
Meyer, P. F.	Faribault
Meyerding, E. A.	St. Paul
Meyerding, H. W.	Rochester
Michael, J. C.	Minneapolis
Michelson, H. E.	Minneapolis
Miller, E. W.	St. Paul
Miller, F. J.	Fort Snelling
Miller, H. A.	Fairmont
Miller, H. E.	Minneapolis
Miller, J. C.	Minneapolis
Miller, V. I.	Mankato
Miller, W. A.	New York Mills
Mills, J. H.	Rochester
Mills, J. L.	Winnebago
Milton, J. S.	Minneapolis
Miners, G. A.	Deer River
Mingo, F. E.	Hugo
Mitchell, R. S.	Grand Meadow
Moe, J. H.	Minneapolis
Moe, R. J.	Duluth
Moersch, F. P.	Rochester
Moersch, H. J.	Rochester
Moga, J. A.	St. Paul
Mogilner, S. N.	St. Paul
Moir, W. W.	Minneapolis
Molander, H. A.	St. Paul
Monroe, P. B.	Two Harbors
Monson, L. J.	Hendricks
Montgomery, Hamilton	Rochester
Mooney, L. P.	Marble
Moorhead, M. B.	Minneapolis
Moquin, Marie A.	St. Paul
Moran, T. R.	St. Paul
More, C. W.	Eveleth
Morehead, D. E.	Owatonna
Moren, Edward	Minneapolis
Moriarty, Berenice	St. Paul
Moriarty, Cecile R.	Minneapolis
Mork, B. O.	Worthington
Mork, B. O., Jr.	Worthington
Morley, G. A.	Crookston
Morrissey, F. B.	St. Paul
Morrison, A. W.	Minneapolis
Morrow, J. J.	Austin
Morse, M. P.	Le Roy
Morse, R. W.	Minneapolis
Morsman, L. W.	Hibbing
Morss, C. R.	Zumbrota
Mortenson, N. G.	St. Paul
Morton, H. McI.	Vinsentown, N. J.
Mosby, M. E.	Browerville
Moses, Joseph, Jr.	Northfield
Moss, M. N.	St. Paul
Moyer, R. E.	Fort Snelling
Moynihan, A. F.	Sauk Center
Moynihan, T. J.	St. Paul
Mueller, Selma C.	Duluth
Muller, R. T.	St. Paul
Murdoch, J. M.	Faribault
Murphy, I. J.	Minneapolis
Murphy, Leo	Minneapolis
Mussey, R. D.	Rochester
Myers, J. A.	Minneapolis
Myers, Thomas	St. Paul
Myre, C. R.	Paynesville
Naegeli, A. E.	St. Paul
Naegeli, Frank	Fergus Falls
Nagel, H. D.	Waconia
Nass, H. A.	Mabel
Nathanson, M. H.	Minneapolis
Nauth, W. W.	Winona
Neal, J. M.	Minneapolis
Neher, F. H.	St. Paul
Nehring, J. P.	Preston
Neilson, H. F.	Minneapolis
Nelson, E. H.	Chisholm
Nelson, E. J.	Owatonna
Nelson, Harvey	Minneapolis
Nelson, H. E.	Crookston
Nelson, H. S.	Minneapolis
Nelson, L. A.	St. Paul
Nelson, M. C.	Lowry
Nelson, M. S.	Granite Falls
Nelson, N. P.	Brainerd
Nelson, O. E.	Minneapolis
Nelson, R. L.	Duluth
Nelson, W. I.	Minneapolis
Nethercott, E. G.	Pine City
Nettrour, W. S.	Rochester
Neumann, C. A.	Winona
New, G. B.	Rochester
Newhart, Horace	Minneapolis
Nichols, A. E.	St. Paul
Nicholson, M. A.	Duluth
Nilson, H. J.	North Mankato
Ninneman, N. N.	Silver Lake
Nippert, H. J.	St. Paul
Noble, J. F.	St. Paul
Nordin, C. G.	St. Paul
Nordin, G. T.	Minneapolis
Nordland, Martin	Minneapolis
Nordman, W. F.	Mora
Norman, J. F.	Crookston
Norrgard, H. T.	Milaca
Norris, G. H.	Annandale
Noth, H. W.	Minneapolis
Novak, E. E.	New Prague
Nuetzman, A. W.	Faribault
Nutting, R. E.	Duluth
Nye, Katherine A.	St. Paul
Nye, Lillian L.	Portland, N. Y.
Nystrom, Ruth	Minneapolis
Oberg, C. M.	Minneapolis
O'Brien, W. A.	Minneapolis
Ochsner, C. G.	Wabasha
Ochsner, H. C.	Rochester
O'Connor, D. C.	Eden Valley
O'Connor, L. J.	St. Paul
Odel, H. M.	Rochester
O'Donnell, J. E.	Minneapolis
Oeljen, S. C. G.	Waseca
Oerting, Harry	St. Paul
Ogden, Warner	St. Paul
Ohage, Justus	St. Paul
Ohage, Justus, Jr.	St. Paul
Ohnsted, J. L.	McIntosh
O'Leary, P. A.	Rochester
Oliver, C. I.	Graceville
Oliver, I. L.	Graceville
Olson, A. E.	Duluth
Olson, C. A.	St. Paul
Olson, C. J.	Belle Plaine
Olson, E. A.	Pine Island
Olson, F. A.	Minneapolis
Olson, G. E.	West Concord
Olson, J. W.	Cokato
Olson, K. L.	Gibbon
Olson, O. A.	Minneapolis
Olson, P. F.	Rochester
Olson, R. G.	Minneapolis
Olson, W. P.	Gaylord
O'Neal, B. L.	Rochester
Onsgard, L. K., Jr.	Houston
Onsgard, L. K., Sr.	Houston
Oppegaard, C. L.	Crookston
Oppegaard, M. O.	Crookston
Oppen, E. G.	Minneapolis
O'Reilley, B. E.	St. Paul
Ormond, D. T.	Waconia
Osborn, Lida	Mankato
Osborn, B. F.	International Falls
Ostergren, E. W.	St. Paul
Otto, H. C.	Frazee
Ouelette, A. J.	St. Paul
Overend, K. V.	Hallock
Overton, L. M.	Rochester
Owre, Oscar	Minneapolis
Pace, J. McI.	Rochester
Page, C. V.	St. Paul
Page, R. L.	St. Charles
Palmer, C. F.	Albert Lea
Palmer, W. L.	Albert Lea
Pankratz, P. J.	Mountain Lake
Paradis, W. G.	Crookston
Parker, O. W.	Ely
Parker, R. L.	Rochester
Parkhill, Edith M.	Rochester
Parks, A. H.	Minneapolis
Parson, Lillian B.	Elbow Lake
Parson, L. R.	Elbow Lake
Parsons, J. G.	Crookston
Passer, A. A.	Olivia
Patterson, W. E.	Minneapolis
Patterson, W. L.	Fergus Falls
Paul, Louise M.	Minneapolis
Paulsen, E. L.	Minneapolis
Paulson, T. S.	Fergus Falls
Pearce, N. O.	Minneapolis
Pearson, Bjarne	Taylors Falls
Pearson, F. R.	St. Paul
Pedersen, A. H.	St. Paul
*Pederson, Harold	Minneapolis
Pederson, R. M.	Minneapolis
Pemberton, J. de J.	Rochester
Penhall, F. W.	Morton
Pennie, D. F.	Duluth
Pennington, Reuben	Minneapolis
Peppard, T. A.	Minneapolis
Perry, C. G.	St. Paul
Perry, R. St. J.	Minneapolis
Persons, C. E.	Marshall
Pertl, A. L.	Windom
Petersen, J. R.	Minneapolis
Petersen, M. C.	St. Peter
Petersen, Thorvald	Minneapolis
Peterson, A. A.	Mora
Peterson, D. B.	St. Paul
Peterson, D. L.	Rochester
Peterson, E. N.	Eveleth
Peterson, H. W.	Minneapolis
Peterson, J. H.	Duluth
Peterson, J. L. E.	St. Paul
Peterson, N. P.	Minneapolis
Peterson, O. H.	Minneapolis
Peterson, O. L.	Cokato
Peterson, P. E.	Minneapolis
Peterson, R. A.	Vesta
Peterson, V. N.	St. Paul
Peterson, W. C.	Minneapolis
Peterson, W. H.	Minneapolis

---

*Deceased.

Petter, C. K.	Oak Terrace
Pettit, C. W.	Minneapolis
Petit, L. J.	Minneapolis
Peyton, W. T.	Minneapolis
Pfunder, M. C.	Minneapolis
Phelps, A. G.	St. Paul
Phelps, K. A.	Minneapolis
Phillips, A. E.	Delano
Phillips, W. H.	Jordan
Pierce, C. H.	Wadena
Pilcher, Frederick, Jr.	Rochester
Piper, M. C.	Rochester
Piper, W. A.	Mountain Lake
Platou, E. S.	Minneapolis
Plondke, F. J.	St. Paul
Plonske, C. J.	Faribault
Plummer, H. S.	Rochester
Plummer, W. A.	Rochester
Poirier, J. A.	Forest Lake
Pollock, D. K.	Minneapolis
Pollock, L. W.	Rochester
Pollard, D. W.	Minneapolis
Polzak, J. A.	Minneapolis
Popp, W. C.	Rochester
Porter, G. LeR.	Rochester
Portmann, W. C.	Jackson
Power, J. E.	Duluth
Powers, F. W.	Barrett
Prangen, A. D.	Rochester
Pratt, F. J.	Minneapolis
Pratt, J. A.	Minneapolis
Preine, I. A.	Minneapolis
Prendergast, H. J.	St. Paul
Prickman, L. E.	Rochester
Priest, R. E.	Worthington
Priestley, J. T.	Rochester
Prim, J. A.	Minneapolis
Prins, L. R., Jr.	St. Paul
Proshek, C. E.	Minneapolis
Purves, G. H.	Russell

Quanstrom, V. E.	Brainerd
Quinby, T. F.	Minneapolis
Quist, H. W.	Minneapolis

Raadquist, C. S.	Hibbing
Raaf, J. E.	Rochester
Radabaugh, R. C.	Hastings
Rains, J. M.	Willmar
Raiter, F. W. S.	Cloquet
Raiter, R. F.	Cloquet
Ramsey, W. R.	St. Paul
Randall, L. M.	Rochester
Ransom, M. L.	Hancock
Rasmussen, R. C.	St. Paul
Rathbun, A. M.	Rice
Rathbun, C. A.	St. Cloud
Raymond, J. H.	Cass Lake
Rebman, E. C.	Austin
Reed, C. A.	Minneapolis
Reeve, E. T.	Elbow Lake
Reff, A. R.	Crookston
Regnier, E. A.	Minneapolis
Reimann, H. A.	Minneapolis
Reineke, G. F.	New Ulm
Reiter, H. W.	Shakopee
Rempel, D. D.	Brownton
Rice, C. O.	Minneapolis
Richards, E. T. F.	St. Paul
Richards, W. B.	St. Cloud
Richardson, F. S.	Minneapolis
Richardson, H. E.	St. Paul
Richardson, W. J.	Fairmont
Richdorf, L. F.	Minneapolis
Ridgeway, Alexander	South Haven
Ridgway, A. M.	Annandale
Rieke, W. W.	Wayzata
Rigler, L. G.	Minneapolis
Ringle, O. F.	Walker
Ripple, R. J.	New London
Rishmiller, J. H.	Minneapolis
Risser, E. D.	Winona
Ritchie, H. P.	St. Paul
Rivers, A. B.	Rochester
Rizer, R. I.	Minneapolis
Roan, C. M.	Minneapolis
Robb, E. F.	Minneapolis
Robbins, C. P.	Winona
Roberts, L. M.	Little Falls
Roberts, O. W.	Owatonna
Roberts, T. S.	Minneapolis
Roberts, W. B.	Minneapolis
Robertson, H. E.	Rochester
Robertson, J. B.	Cottonwood
Robertson, P. A.	Austin
Robilliard, C. M.	Faribault
Robins, C. R., Jr.	Richmond, Va.
Robinson, J. M.	Duluth
Robinson, L. W.	Denver, Colo.
Robinson, V. C.	Rochester
Robitshek, E. C.	Minneapolis
Rochford, W. E.	Minneapolis
Rodda, F. C.	Minneapolis
Roehlke, A. B.	Elk River
Rodger, C. L.	Minneapolis
Rogers, F. D.	St. Paul
Rogers, J. T.	St. Paul
Rogers, S. F.	St. Paul
Roholt, C. L.	Waverly
Rohrer, C. A.	Waterville
Rood, D. C.	Hibbing
Rose, J. T.	Lakefield
Rosen, Samuel	Minneapolis
Rosenfield, A. B.	Pequot
Rosenholtz, Burton	St. Paul
Rosenow, E. C.	Rochester
Rosenthal, Robert	St. Paul
Rosenwald, R. M.	Minneapolis
Ross, W. P.	Worthington
Rothenburg, J. C.	Springfield
Rothrock, J. L.	St. Paul
Rothschild, H. J.	St. Paul
Rousseau, Victor	Maple Lake
Roust, H. A.	Montevideo
Rowe, O. W.	Duluth
Rowe, W. H.	Fairmont
Roy, J. A.	Red Lake Falls
Roy, Philemon	St. Paul
Rucker, C. W.	Minneapolis
Rucker, W. H.	Minneapolis
Rud, N. E.	Minneapolis
Rudell, G. L.	Minneapolis
Rudie, C. N.	Kenyon
Rudie, P. S.	Duluth
Ruggles, G. McC.	Forest Lake
Ruhberg, G. N.	St. Paul
Rumpf, C. W.	Faribault
Rumpf, W. H.	Faribault
Rupp, Alice	Minneapolis
Russ, H. H.	Blue Earth
Russeth, A. N.	Minneapolis
Rusten, E. M.	Minneapolis
Rutherford, W. C.	St. Paul
Rutledge, L. H.	Detroit Lakes
Ryan, T. J.	St. Paul
Ryan, J. M.	St. Paul
Ryan, M. E.	St. Paul
Ryan, W. J.	Duluth
Rydburg, W. C.	Brooten
Rynearson, E. H.	Rochester

Sach-Rowitz, Alvin	Moose Lake
Sadler, W. P.	Minneapolis
Saffert, C. A.	New Ulm
Sahr, W. G.	Hutchinson
St. Cyr, K. J.	Osseo
Salt, C. G.	Minneapolis
Salter, R. A.	Virginia
Samuelson, L. G.	Mankato
Samuelson, Samuel	Minneapolis
Sanderson, E. T.	Minneota
Sanford, A. H.	Rochester
Sanford, H. S.	Rochester
Sarff, O. E.	Buhl
Satersmoen, Theodore	Pelican Rapids
Sather, E. R.	Alexandria
Satterlee, H. W.	Lewiston
Satterlund, V. L.	St. Paul
Saunders, T. S., Jr.	Rochester
Savage, F. J.	St. Paul
Sawatzky, W. A.	Minneapolis
Schaaf, F. H. K.	Minneapolis
Schaefer, J. F.	Owatonna
Schaefer, S.	Winona
Schaefer, W. G.	Minneapolis
Schatz, F. J.	St. Cloud
Scheldrup, N. H.	Minneapolis
Scherer, C. A.	Duluth
Scherer, R. G.	Dubuque, Iowa
Schimelpfenig, G. T.	Chaska
Schlesselman, George	Anoka
Schlesselman, J. T.	Mankato
Schmidt, H. W.	Rochester
Schmidt, P. A.	Good Thunder
Schmidt, W. R.	Glencoe
Schmitt, A. F.	Minneapolis
Schmitt, S. C.	Minneapolis
Schneider, H. A.	Jordan
Schneider, J. P.	Minneapolis
Schoch, R. B.	St. Paul
Scholpp, O. W.	Hutchinson
Schons, Edward	St. Paul
Schottler, G. T.	Dexter
Schottler, M. E.	Minneapolis
Schroder, C. H.	Duluth
Schuldt, F. C.	St. Paul
Schulhof, M. G.	Rochester
Schultz, J. A.	Albert Lea
Schultz, P. J.	Minneapolis
Schulze, A. G.	St. Paul
Schussler, O. F.	Minneapolis
Schutz, E. S.	Mountain Lake
Schwartz, V. J.	Minneapolis
Schwyzer, Arnold	St. Paul
Schwyzer, Gustav	Minneapolis
Scofield, C. L.	Benson
Scott, E. E.	St. Paul
Scott, F. H.	Minneapolis
Scott, H. G.	Minneapolis
Seashore, D. E.	Duluth
Seashore, R. T.	Duluth
Seashore, Gilbert	Minneapolis
Seeley, I. F.	Northfield
Seham, Max	Minneapolis
Seifert, M. H.	Excelsior
Seifert, O. J.	New Ulm
Sellers, G. K.	Motley
Selleseth, I. F.	Minneapolis
Senkler, G. E.	St. Paul
Senn, E. W.	Owatonna
Serkland, J. C.	Rothsay
Setzer, H. J.	St. Paul
Shaleen, A. W.	Hallock
Shannon, S. S.	Crosby
Shapiro, E. Z.	Duluth
Shastid, T. H.	Duluth
Shaw, A. W.	Buhl
Shedlov, Abraham	Fosston
Sheedy, C. L.	Austin
Sheldon, W. D.	Rochester
Shellman, J. L.	St. Paul
Shelver, H. J.	Ortonville
Sheppard, Fred	Hutchinson
Sheppard, P. E.	Hutchinson
Sherman, C. L.	Luverne
Sherman, H. T.	Plainview
Sherwood, G. E.	Kimball
Shillington, M. A.	St. Paul
Shoemaker, Rosemary	Rochester
Short, Jacob	St. Paul
Shrader, J. S.	Hollandale
Simison, C. W.	Hawley
Simons, B. H.	Chaska
Simons, E. J.	Swanville
Simons, J. H.	Minneapolis
Simpson, E. D.	Minneapolis
Sinamark, Andrew	Hibbing
Singer, B. J.	St. Paul
Siperstein, D. M.	Minneapolis
Sitar, R. F.	Minneapolis
Sivertsen, Ivar	Minneapolis
Skinner, H. O.	St. Paul
Skjold, A. C.	Minneapolis
Slater, S. A.	Worthington
Slavens, J. J.	Toronto, Canada
Slocumb, C. H.	Rochester
Slocumb, J. A.	Plainview
Slyfield, F. F.	Duluth
Smersh, J. F.	Owatonna
Smisek, E. A.	St. Paul
Smith, A. E.	Minneapolis
Smith, A. M.	Minneapolis
Smith, A. M.	Thief River Falls
Smith, B. A.	Crosby
Smith, B. F.	Rochester
Smith, C. M.	Duluth
Smith, E. H.	Bemidji
Smith, E. H.	Eagle Bend
Smith, F. D.	Kasson
Smith, F. L.	Rochester
Smith, H. L.	Rochester
Smith, H. R.	Minneapolis
Smith, L. G.	Montevideo
Smith, M. W.	Red Wing
Smith, N. D.	Rochester
Smith, N. M.	Minneapolis
Smith, P. A.	Faribault
Smith, W. R.	Grand Marais
Snell, A. M.	Rochester
Snyder, G. W.	St. Paul
Soderlind, R. T.	Minneapolis
Sogge, L. L.	Windom
Sohlberg, O. J.	St. Paul
Sohmer, A. E.	Mankato
Soine, T. S.	Barnesville
Solhaug, S. B.	Minneapolis
Solsem, F. N.	Sacred Heart
Sommer, A. W.	Elmore
Sonnesyn, N. N.	Le Sueur
Sorenson, E. M.	Round Lake
Souster, B. B.	St. Paul
Spano, J. P.	Minneapolis
Spicer, F. W.	Duluth
Sprafka, J. M.	St. Paul
Spratt, C. N.	Minneapolis
Spurbeck, R. G.	Cloquet
Spurzem, R. J.	Anoka
Stacy, L. J.	Rochester
Stafford, C. E.	Dent
Stafne, W. A.	Moorhead
Stalker, L. K.	Rochester
Stangl, Fred	St. Cloud
Stangl, P. E.	St. Cloud
Stanley, C. R.	Worthington
Steenrod, E. J.	Rochester
Steffens, L. A.	Red Wing
Stein, K. E.	Lakeville
Stein, R. J.	Pierz
Steiner, J. W.	Winona
Stelter, L. A.	Minneapolis
Stenstrom, Annette T.	Minneapolis
Stephan, E. L.	Hinckley

Sterner, E. G.	St. Paul
Steube, R. W.	Alexandria
Steven, George	Byron
Stevens, F. A.	Lake Elmo
Stevens, G. A. W.	Rochester
Stevens, John	Gonvick
Stevenson, B. M.	Fulda
Stewart, Alexander	St. Paul
Stewart, A. B.	Owatonna
Stewart, C. A.	Minneapolis
Stewart, Gwendolyn	Faribault
Stewart, R. I.	Minneapolis
Stillwell, W. C.	Mankato
Stinnette, S. E.	St. Paul
Stoeckmann, A. E.	St. Paul
Stomel, Joseph	Minneapolis
Strachauer, A. C.	Minneapolis
Strand, E. V.	Bayport
Strate, G. E.	St. Paul
Strathern, F. P.	St. Peter
Strathern, M. L.	Gilbert
Stratte, A. K.	Pine City
Stratte, H. C.	Windom
Strobel, W. G.	Duluth
Strohl, E. L.	Rochester
Strout, E. S.	Minneapolis
Strout, G. E.	Minneapolis
Stuart, A. B.	Cloquet
Stuart, H. A.	Rochester
Stuhler, L. G.	Rochester
Stuhr, J. W.	Stillwater
Sturre, J. R.	Minneapolis
Stuurmanns, S. H.	Erskine
Sukeforth, L. A.	Duluth
Sullivan, R. R.	Rochester
Sundt, Mathias	Minneapolis
Sutherland, C. G.	Rochester
Sutherland, H. N.	Ely
Sutton, C. S.	St. Cloud
Sutton, L. F.	Mazeppa
Swanson, Cephas	Minneapolis
Swanson, E. O.	St. Paul
Swanson, J. A.	St. Paul
Swanson, P. E.	Virginia
Swanson, R. E.	Minneapolis
Swedenburg, A. W.	Thief River Falls
Swedenburg, P. A.	Chula, Ark.
Sweetser, H. B., Jr.	Minneapolis
Sweetser, H. B.	Minneapolis
Sweetser, T. H.	Minneapolis
Sweitzer, S. E.	Minneapolis
Swendseen, C. G.	Minneapolis
Swendson, J. J.	St. Paul
Swensen, R. G.	Harris
Swenson, A. O.	Duluth
Swenson, O. J.	Waseca
Swezey, B. F.	Buffalo
Sybilrud, H. W.	Bricelyn

Tangen, G. M.	Canby
*Tanner, A. C.	Minneapolis
Tanquist, E. J.	Alexandria
Tavenner, J. L.	Waseca
Teall, R. C.	Rochester
Teem, M. Van B.	Rochester
Teisberg, C. B.	St. Paul
Telford, V. J.	Litchfield
Ternstrom, O. H.	Minneapolis
Thabes, J. A., Jr.	Brainerd
Thabes, J. A., Sr.	Brainerd
Thayer, E. A.	Truman
Thiessen, N. W.	Rochester
Thomas, G. E.	Minneapolis
Thomas, G. J.	Minneapolis
Thompson, Albert	St. James
Thompson, Arthur	Cokato
Thompson, F. A.	St. Paul
Thompson, G. J.	Rochester
Thompson, V. C.	Marine-on-St. Croix
Thomson, J. M.	Brownsdale
Thordarson, Theodore	Minneota
Thoreson, M. O.	St. Paul
Thorson, E. O.	Luverne
Thorson, O. P.	Northfield
Thysell, F. A.	Moorhead
Thysell, V. D.	Hawley
Tibbetts, M. H.	Duluth
Tierney, C. M.	Harmony
Tifft, C. R.	St. Paul
Tilderquist, D. L.	Duluth
Tinker, C. M.	Stewart
Tofte, Josephine	Dawson
Torgerson, W. B.	Oklee
Tovell, R. M.	Rochester
Traeger, C. A.	Faribault
Traxler, F. J.	Henderson
Tregilgas, H. R.	So. St. Paul
Trombley, R. A.	Emmons
Troost, H. B.	Mankato
Trueman, H. S.	Minneapolis
Truog, C. P.	Lindstrom
Trutna, T. J.	Silver Lake
Tunstead, H. J.	Minneapolis
Tuohy, E. B.	Rochester
Tuohy, E. L.	Duluth
Turnacliff, D. D.	Minneapolis
Turnbull, Andrew	Rochester
Tweedy, G. J.	Winona
Tyrrell, C. C.	Minneapolis

Ude, W. H.	Minneapolis
Ulrich, H. L.	Minneapolis
Undine, C. A.	Minneapolis
Urberg, S. E.	Duluth
Urner, J. A.	Minneapolis

Vaaler, T.	Cannon Falls
Vadheim, A. L.	Tyler
Vail, J. B.	Henning
Valentine, W. H.	Tracy
Van Meier, Henry	Stillwater
Van Slyke, C. A.	St. Paul
Van Valkenburg, B. F.	Long Prairie
Vaughan, V. M.	Truman
Veirs, Dean	St. Paul
Veirs, Ruby S.	St. Paul
Venables, A. E.	St. Paul
Vercellini, C. E.	Duluth
Vezina, J. C.	Mapleton
Vik, Melvin	Onamia
Vinson, P. P.	Rochester
Vogel, H. A. L.	New Ulm
Vogel, J. H.	New Ulm
Vonder Weyer, William	St. Paul
Voyer, E. O.	Minneapolis

Waas, C. W.	St. Paul
Wagener, H. P.	Rochester
Wahlberg, E. W.	Isle
Wahlquist, H. F.	Minneapolis
Waldron, C. W.	Minneapolis
Waldron, G. W.	Fort Peck, Montana
Walker, A. E.	Duluth
Walker, A. E.	St. Paul
Walker, G. H.	Winona
Wall, C. R.	Minneapolis
Waller, J. D.	Wilmont
Walter, C. W.	St. Paul
Walters, Waltman	Rochester
Wangensteen, O. H.	Minneapolis
Wanous, E. Z.	Minneapolis
Ward, A. W.	Minneapolis
Ward, C. E.	Rochester
Ward, P. A.	Minneapolis
Warham, T. T.	Minneapolis
Warnock, R. W.	St. Paul
Warren, E. L.	St. Paul
Warren, F. S.	Washington, D. C.
Watkins, C. H.	Rochester
Watson, A. M.	Royalton
Watson, J. A.	Minneapolis
Watson, J. D.	Holdingford
Watson, N. M.	Red Lake Falls
Watz, C. E.	St. Paul
Waugh, J. M.	Rochester
Webb, R. C.	Minneapolis
Webber, E. E.	Duluth
Weber, H. M.	Rochester
Weed, V. A.	Red Lake Falls
Weir, J. F.	Rochester
Weiser, G. B.	New Ulm
Weisman, S. A.	Minneapolis
Welch, C. S.	Rochester
Welch, M. C.	St. Paul
Wellbrock, W. L. A.	Rochester
Wells, W. B.	Sherburn
Welsh, A. L.	Rochester
Wenner, W. T.	St. Cloud
Wentworth, A. J.	Mankato
Werner, O. S.	Cambridge
Wesson, H. R.	Rochester
West, E. J.	Duluth
Westby, Magnus	Madison
Westby, Nels	Madison
Westerman, A. E.	Montgomery
Westerman, F. C.	Montgomery
Westman, R. T.	Minneapolis
Wethall, A. G.	Minneapolis
Wetherby, Macnider	Minneapolis
Weum, T. W.	Minneapolis
Wheeler, D. W.	Duluth
Wheeler, M. W.	St. Paul
Wherry, F. P., Jr.	Rochester
Whitacre, J. C.	St. Paul
White, S. M.	Minneapolis
Whitmore, Frank	St. Paul
Whitson, S. A.	Alden
Whittaker, L. D.	Rochester
Widen, W. F.	Minneapolis
Wiese, H. F. B.	Minneapolis
Wilbur, D. L.	Rochester
Wilcox, A. E.	Minneapolis
Wilder, R. L.	Minneapolis
Wilder, R. M.	Rochester
Wilken, P. A.	Minneapolis
Wilkerson, V. A.	Washington, D. C.
Wilkinson, Stella L.	Duluth
Wilkowske, R. J.	Nerstrand
Will, W. W.	Bertha
Willcutt, C. E.	Minneapolis
Williams, A. B.	St. Paul
Williams, C. A.	Pipestone
Williams, C. K.	St. Paul
Williams, H. L., Jr.	Rochester
Williams, H. O.	Lake Crystal
Williams, L. A.	Slayton
Williams, M. R.	Cannon Falls
Williams, Robert	Minneapolis
Williams, R. V.	Rushford
Williamson, G. A.	St. Paul
Willius, F. A.	Rochester
Wilmot, H. E.	Litchfield
Wilson, C. E.	Blue Earth
Wilson, J. A.	St. Paul
Wilson, J. V.	St. Paul
Wilson, L. B.	Rochester
Wilson, R. H.	Winona
Wilson, V. A.	Minneapolis
Wilson, Warren	Northfield
Wilson, W. E.	Northfield
Wilson, W. F.	Lake City
Wiltrout, I. G.	Oslo
Windsor, R. L.	Rothsay
Winer, L. H.	Minneapolis
Winnick, J. B.	St. Paul
Winter, J. A.	Duluth
Winther, Nora M. C.	Minneapolis
Witham, C. A.	Minneapolis
Withrow, M. E.	International Falls
Wittich, F. W.	Minneapolis
Woltman, H. W.	Rochester
Wohlrabe, A. A.	Minneapolis
Wohlrabe, C. F.	Minneapolis
Wohlrabe, E. J.	Springfield
Wold, K. C.	St. Paul
Wolfe, H. H.	St. Paul
Wolff, H. J.	St. Paul
Wolner, O. H.	St. Peter
Wood, D. F.	Minneapolis
Wood, H. G.	Rochester
Woodruff, C. W.	Chatfield
Woodworth, Elizabeth	Minneapolis
Woodworth, L. F.	Le Center
Workman, H. M.	Tracy
Workman, W. G.	Tracy
Wright, C. B.	Minneapolis
Wright, C. D.	Minneapolis
Wright, C. O.	Luverne
Wright, F. R.	Minneapolis
Wray, W. E.	Campbell
Wunder, H. E.	Shakopee
Wyatt, O. S.	Minneapolis
Wynne, H. M. N.	Minneapolis

Yaeger, W. W.	Ivanhoe
Ylvisaker, R. S.	Minneapolis
Yoerg, O. W.	Minneapolis
Young, T. O.	Duluth
Young, V. A.	Duluth
Younger, L. I.	Winona
Youngerman, W. M.	Rochester
Youngren, E. R.	St. Paul

Zachman, A. H.	Melrose
Zachman, L. L.	St. Paul
Zander, C. H.	St. Paul
Zaworski, E. A.	Minneapolis
Zeien, Thomas	North Branch
Zellhoefer, H. W. K.	Rochester
Zemke, E. E.	Fairmont
Zide, H. A.	Rochester
Zierold, A. A.	Minneapolis
Zimmermann, H. B.	St. Paul
Zintek, A. R.	Winona
Ziskin, Thomas	Minneapolis
Zlatovski, Michael	Duluth

---

*Deceased.

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society.

Volume 18 JUNE, 1935 Number 6

THE HISTORY OF THE DEVELOPMENT OF SURGERY FOR PEPTIC ULCER

E. STARR JUDD, M.D.

Rochester, Minnesota

IT HAS repeatedly been said that there is nothing in the writings of Hippocrates which would lead to the conclusion that he was familiar with gastric ulcer as it is known today. Likewise, a translation of Galen's work makes no mention of peptic ulcer. However, both of these men described cases in which there was vomiting of blood associated with digestive disturbances and abdominal pain.

A graphic description of peptic ulcer apparently did not appear until the sixteenth century. At that time, Johann Bauhin wrote about the case of a woman eighteen years of age who had perforation of the stomach, with fluid and remnants of food in the peritoneal cavity. Later in the sixteenth century (1586), Marcellus Donatus reported finding a gastric ulcer at postmortem examination of a man sixty-nine years of age. Records of healed gastric ulcers were made in the sixteenth century by Forestus and von Grafenberg.

Matthew Baillie is credited with giving the first accurate description of the anatomic features of simple gastric ulcer in 1793. He also included clinical data in his report. Early in the eighteenth century Voigtel, Meikel, and Reil described peptic ulcer. Toward the end of that century, Hunter discussed perforations of the stomach. As Spallanzani had suggested previously, Hunter felt that the condition was caused by the eroding action of gastric juices. A few investigators subscribed to his views, but it was a long time before this conception gained favor generally. In 1800 Joseph Morin stated that perforation of the stomach was the result of a protracted local inflammatory process; he also mentioned auto-digestion as one of the causes.

The first report of gastric ulcer which had perforated apparently was made by Christopher Rawlinson in 1729. The discussions of the subject by Laine in 1819 and by Abercombie in 1824 are remarkable for their time. In the first half of the nineteenth century, Cruveilhier made the distinction between gastric ulcer, gastric cancer, and gastritis. Most of the writers of this time were especially interested in gastric perforation, although Cruveilhier detailed the development of chronicity, obstruction, hemorrhage, scarring, and contraction.

Hemmeter stated that, next to Cruveilhier, Rokitansky had the greatest influence in forming the modern conception of gastric ulcer, and that the anatomic part of his description has served as a model for all subsequent writers on this subject. He attributes to these two men the beginning of the modern era in the history of gastric ulcer. Some years later (1855), Virchow suggested the hemorrhagic, necrotic origin of simple peptic ulcer. His thesis gained a large following.

To Schiff, in 1845, is attributed the recognition of the possibility that local hemorrhages in the stomach might result from irritation of certain parts of the brain. It is evident that, by 1852, Lebert recognized the vascular factor in the etiology of gastric ulcer. Muller and Pavy demonstrated that ligation of the arteries to various regions of the stomach caused large acute ulcers. By 1860 Ludwig Müller had prepared and published an extensive monograph on gastric ulcer.

It is known that gastric ulcer was recognized as early as 1600, and that perforated duodenal ulcer was reported in 1793 by Penado of Padua. However, it was not until the twentieth century that a clear-cut distinction was established between these lesions. In the year 1906, Hemmeter made an attempt to visualize gastric ulcer by giving patients small amounts of barium in the hope that some flecks might adhere to the ulcer craters and thus be revealed by the roentgen rays. Although the etiology of the conditions undoubtedly is somewhat allied, they must be looked on as distinct entities. The fact that stands out as a dividing line is the extreme rarity of malignancy in the duodenum and the relative frequency with which malignant ulcerations are found in the stomach. With all the advancement that has been made it is often impossible to distinguish clinically between carcinomatous gastric ulcer and ulcerating carcinoma. As these two conditions were more definitely differentiated, changes in the methods of treatment took place.

Evidently, Hippocrates was none too optimistic about the future of gastric surgery, for he stated that accidental wounds of the stomach were deadly. Then, after the lapse of about 300 years, Galen commented that wounds of the stomach had been known to heal, although seldom. Early in the sixteenth century, Fallopius recommended suturing wounds of the stomach. Some of the methods used to secure closure of these wounds were novel. After approximating the edges, ants' heads were used as clips. When the ants closed their jaws, their bodies were cut off and the heads remained attached until the wounds were closed. The mandibles were asceptic by virtue of the formic acid normally present in them.

In all the centuries prior to 1800 surgery was not conceded a dignified place among the sciences. With but few exceptions, it was in the hands of quacks, charlatans, and barbers. Yet some of the feats these men accomplished are remarkable. In 1500 a sow-gelder is reputed to have successfully carried out cesarean section on his wife. The first accepted cesarean operation was performed in 1610 by Trautman of Wittenberg. About this time another sow-gelder carried out ovariotomy on his daughter. It was only after repeated efforts that a charter was obtained for the establishment of the Royal College of Surgeons. The general lay opinion of the day was aptly expressed by a well-known British statesman who is said to have admonished the House of Lords by saying: "There is no more science in surgery than in butchering." This feeling is not surprising when one realizes the obstacles these men had to overcome, such as pain and sepsis, and their inability to control bleeding. The recognition of the healing of wounds by blood clot and the ligation of vessels were the outstanding accomplishments before 1800. The discovery of anesthesia and antiseptics enabled surgery to lay claim to recognition among the sciences. Dennis, in 1904, stated that "the four great discoveries, the circulation of the blood, the repair of wounds, anesthesia, and antiseptics, are the corner stones upon which a superstructure has been erected that has become a veritable temple of science, the dimensions of which eclipse in grandeur all other temples."

In 1810 Merren carried out the first experimental study of the possibilities of gastric surgery. He attempted pylorectomy, using dogs. Reference to statistics of operations on the stomach prior to 1875 indicates that the mortality rate in twenty-eight operations was 100 per cent. In the next ten years, considerable improvement took place, for the mortality rate was reduced to 82 per cent. In 1876, Gaussenbauer and Winiwarter resumed Merren's work, and they carried out resection of the pylorus of dogs with moderate success. About this time, Billroth and his assistants entered the picture. Billroth prophesied that gastric resection would be the next step in the development of surgery of the stomach. Péan, in 1879, and Rydygier, in 1880, attempted pylorectomy in man. Reports in the literature indicate that both Billroth and Rydygier were successful in performing resection of the pylorus in man in 1881; the procedure, however, became known as the Billroth I operation. It is possible that Nicoladoni proposed gastro-enterostomy that same year, but it remained for Wölfler to employ the operation with a good palliative result in a case of advanced carcinoma of the pylorus, and he gave the operation its name. In 1883, Courvoisier devised a gastro-enterostomy to be carried out by a retrocolic approach. By 1884, Ransohoff of Cincinnati was performing gastro-enterostomy. In the same year, digital dilatation of the pyloric sphincter was proposed by Loretta, indicating that the influence of sphincteric action in the production of ulcer has been recognized for at least fifty years. The year 1885 found von Hacker performing posterior gastro-enterostomy and Billroth discarding his first method of gastric resection in favor of the procedure now known as the Billroth II operation. A plastic procedure on the pylorus was carried out independently by Heineke, in 1886, and by Mikulicz, in 1887. At this time, Rydygier suggested that bleeding ulcer could be resected and pyloroplasty made, but there is no actual proof that he actually adopted this plan. In 1889 Mikulicz first attempted suture of a perforated ulcer. His patient died. Three years later the procedure was carried out by Kriege and his patient recovered. Partial gastrectomy was twice performed by Langenbeck in 1894. Schlatter successfully performed a complete gastrectomy in 1897. The operation is justified in a few instances, but the risk is too great and the ultimate results are too unsatisfactory to warrant employing it very often.

To Jaboulay, in 1892, is attributed the first suggestion of the possibilities of lateral gastroduodenostomy. Codivilla is credited with the performance of the first gastro-enterostomy for duodenal ulcer. He carried this out in 1893. During this period, Halsted was working on a modification of pyloroplasty, using lateral anastomosis. In 1898, Henle made clinical application of lateral gastroduodenostomy; he gave Mikulicz credit for the plan. Finney stated that his gastropyloro-duodenostomy, better known as the "Finney pyloroplasty," was an outgrowth of that work.

According to Mayo-Robson, there were 184 operations for gastric ulcer prior to 1900, not including the operations for perforation or hemorrhage, and the mortality rate was 16.4 per cent. Keen predicted that, as the technic improved, the mortality rate in the most difficult operations ought not to be greater than 10 per cent. This goal has long since been reached, for in 2,276 consecutive operations of all types, performed for gastric ulcer between 1906 and 1931, the operative mortality rate was 5.14 per cent.

The transition from primitive medicine to the surgery of our day is astounding. Many of the steps in our progress are directly traceable to suggestions gained from the study of the views expressed by our forebears, though in their time their ideas may have been thought to be untenable. Most of the operations originally were planned to remove a malignant process, or to relieve symptoms caused by neoplastic growths. However, even with the increased knowledge of peptic ulcer, a number of these surgical procedures have been retained and, with slight modification, are in use today.

Up to the present there are no clinical or roentgenologic criteria that will determine whether there is an area of malignancy in the border of a chronic gastric ulcer; it is evident, therefore, that the lesion must be removed before one can proceed with certainty in carrying out treatment. For a number of years, surgical treatment has been recommended at the clinic to practically all patients with gastric ulcer, but it should be emphasized that when this is carried out it should be as conservative as is consistent with the extent and nature of the lesion.

Formerly, a large proportion of patients were treated by gastro-enterostomy alone, and it proved a suitable procedure in many instances because the disease had been allowed to progress to an advanced stage. But, with developments in surgical technic and the trend toward earlier opportunity to diagnose the condition, excision with knife or cautery and gastrojejunostomy justly gained in favor. Approximately 90 per cent of gastric ulcers are situated along the lesser curvature. Eighty per cent of these lesions are small, and many of them are probably best treated by this method. About 6 per cent of all patients will be found to have multiple ulcers necessitating partial gastric resection. If it is found that the ulcer has undergone malignant change, resection of the stomach is required, and the posterior Polya type of procedure usually is preferable.

During the past few years, there has been a tendency to be more radical in the treatment of both benign and malignant lesions of the stomach. If a malignant condition is present, or if there is good reason to suspect its presence, a radical operation is fully justified. But, if the surgical condition is an ulcer of the stomach or duodenum, the treatment should be conservative. A review of the results of several thousand operations performed over a period of years impresses one with the fact that the conservative procedures should be employed more often than they are at present. In a large group of cases of benign gastric ulcer, excision of the lesion and gastrojejunostomy gave very satisfactory relief. The incidence of jejunal ulcer following this operation for gastric ulcer is practically nil. In most instances, excision and local operation for duodenal ulcer has afforded complete relief.

The immediate mortality following conservative operations for ulcer of the stomach and of the duodenum is less than that of any other procedure, and the ultimate results are more satisfactory than those obtained after radical treatment.

THE MANAGEMENT OF ESSENTIAL HYPERTENSION*

E. L. TUOHY, B.A., M.D., F.A.C.P.

Duluth, Minnesota

THE subject assigned to me is a formidable one. Some of its terrifying features are lessened by the limitation—"a discussion upon the *management* of essential hypertension." I infer that I need not attempt to summarize the confusing literature which has accumulated on the subject nor attempt to evaluate diagnostic technic. When a hypertensive state has back of it a known presumptive cause it is not essential. Unless otherwise specified, the term "hypertension" as I shall use it is the essential form. I shall refer at some length to what is still incompletely proven—"conditioned subjects"; and to multiple factors in contrast to unitary etiology. The cycle of the disease and its span shall receive more attention than some may deem either necessary or justified. This is because of its very great importance in prognosis and treatment. Hypertension (like a wife) is something, for the most part, to learn to live with amicably rather than to avoid or hold in contempt. A totally inadequate or unsatisfactory consort may be divorced; but an established hypertension is a permanent endowment, regardless of the degree or level to which therapy may force the blood pressure readings or to which they may spontaneously recede. A great confusion of terms exists; no one can dispose of this transitional incubus; it just gradually works itself out. Blood pressure elevations are not synonymous with hypertensive disease. The status may obtain with normal tension. The average hypertensive has a relatively long life expectancy. To hold the position of a wise medical adviser challenges our general fitness within the province of the guild of healing. The sum total today of hypertensives among our patients mounts into very high brackets. Mortuary tables reflect this incidence, but the isolated factor of hypertension may be overestimated. Cardiovascular, cardiorenal, arteriosclerotic, coronary, anginal and diabetic episodes all override. The particular group of hypertensives which furnishes my thesis abounded long before the mensuration of either Riva Rocci or Janeway began, in the last decade of the last century. Blood pressure readings have not been overdone, but their interpretation has called for a wider knowledge and a broader philosophical comprehension than many have brought to it. I shall aim to avoid the manner of the medical propagandist portraying vital statistics to urge prevention. Rather is it my desire to catalogue some working formulæ based upon observing the spontaneous courses of not a few hypertensive patients and to outline my impressions gleaned from the mass of opinion, chronicled in current magazines and almost routinely featured at our medical clinics and programs.

Hereditary Background†

Doctors have long held that the individuals ultimately proving to be hypertensive have their forebears to thank for their constitutional trends. It is generally agreed also that the physiological perversion yielding increased resistance in the precapillary arterioles precedes for years or decades the organic pathological imprints so much portrayed in the medical literature of the last three decades. Recently, Brown, Craig and Adson‡ of the Mayo Clinic have reported studies and operative procedures which lend strong support to this conviction. Through the use of the method of ice water immersion of a hand, after a series of blood pressure readings at rest, Brown asserts that certain "conditioned" folks may well be segregated even before their puberty. Within this group, he states, this vasomotor stimulus (one of several may be used), acting upon an oversensitive center in the diencephalon, induces an exceptional and overactive blood pressure response. These hyperirritable reactors furnish the conditioned individuals (often with demonstrable hereditary backgrounds) who may, as the years go by, translate their physiological vasomotor irritability, first into fixed periodic sustained hypertensive episodes, and in time leading to the permanent anatomical imprints masquerading as hypertensive disease. Brown's critics are likely to maintain that his contention remains an unprovable hypothesis, with the temporal limitations of any observer plus the doubtful records or evidences available to him from previous records or mortuary reports. Nevertheless, it fits in very well with accepted clinical experience and has in a limited number of severe type cases (where Adson did bilateral supralumbar anterior nerve root sections) yielded striking clinical results. I shall return to this later in discussing the limited group where a high degree of arteriolar spasm exists, as evidenced in the eyegrounds, with fluctuating pressures accompanying (as a rule) kidney failure and uremic poisoning. In a broader sense (if the report of Brown and Adson finds confirmation) it should lead to clearer clinical reasoning and saner directional dietetic and therapeutic practices. The prayerful hope might be expressed that this type of study would put a quietus on the rather futile quest for a "specific cause"—a search, probably, as Quixotic as Ponce de Leon's effort to find the "Fountain of Youth."

---

*From the Department of Medicine, The Duluth Clinic, Duluth, Minnesota. Read before the Southern Minnesota Medical Society, Mankato, Minnesota, August 13, 1934.

†C. C. Little, managing director of the American Society for Control of Cancer, doubts, on grounds of exact experimentation, such deductions. The clinician can only plead the plight of the brave Holland lad with his hand plugging the dyke, or the hunter holding the bear's tail the while his partner explored the den in search of the cubs!

The term "conditioned" is confusing without graphic illustrations. Hence, I go to the field of hematology to borrow a very gratifying and recent scientific development. Certain anemias are well on the way to control, both as to an etiological understanding and workable therapy. Our own countrymen (Castle, Murphy, Minot, Morris and others) have brought to science and the world not only clarity in this greatly involved field but indirectly in our general appreciation of physiological perversions and the necessary limitations of what we have long held to be "organ" diseases and entities. The macrocytic anemias (at least four such) may be grouped and based upon gastrointestinal inadequacies resulting in a lack of erythropoietic maturation stimuli that totally upsets certain bone marrow sequences. Malignant granulopenia, on the other hand, is seen to be a primary bone marrow activity suspension, where the victim usually dies a bacterial death because his bone marrow is "conditioned" to certain "anaphylactoid" reactions. These may be a variety of substances temporarily or permanently inhibiting the building of the only leukocytes capable of restraining coccal infection. This terminal bacteriological death must not cause us to overlook the physiological break which prepared the soil. This point of view needs much emphasis because we have too long been "conditioned" (going back to the psychological use of the term) to what we may call "two-dimensional disease"—an etiological entity fully potent in itself—an available host.

In the illustrations above recited I wish to draw attention, as well, to the complementary interaction of the gastrointestinal tract on the one hand and the bone marrow on the other. The epochal development leads us not so much to the overthrowing of Virchow* as to a reacceptance of Hippocrates. It is returning us to an appreciation of the question of soil and constitution—a pointing out, especially in chronic nutritional and neurogenic states, of the importance of factors other than specific causation.

Close attention to the physiological breaks which divulge these factors glimpses for us certain therapeutic advances in conditions long baffling and presenting an adamantine front when approached from the angle of bacterial causation or their resultant immunological defense. I have already sketched the example of the anemias, and substitution therapy in myxedema and diabetes comes to mind. One might also mention the efficient preventive therapy in a state as annoying and hereditarily conditioned as migraine.† It is not a forlorn hope that pharmaceutical research, plus some subtle leading out of the Occidental spirit into a better utilization of our instinctive faculties, may lead to the relief of needless arteriolar spasm among our people, and bring us that freedom from hypertension said to obtain in the crowded and circumscribed living of the Orient. We may even hope that this may be accomplished without imposing upon our people the individual squalor and caste limitations that years of economic pressure and intellectual futility have visited upon the Orient. In the meantime, I plead that we may cultivate the broadest understanding of the hypertensive's problems, with the greatest emphasis upon the ability to sense our patient's yearly needs as one setup in his development follows another, comparable with the diurnal or weekly changes of a pneumonia or typhoid victim. It is readily grasped that any disease which extends its course over an indefinite period calls for more management than treatment; and it has often been said, that "only the complications of hypertension call for treatment."

---

‡Brown, G. E., Craig, Winchell McK., and Adson, A. W.: Effect of Sympathectomy on Severe Forms of Essential Hypertension. Read before the Minnesota State Medical Association meeting in Duluth, July 16, 1934. Published in MINNESOTA MEDICINE, March 1935, page 134.

*Virchow made clear the way for accepting the specific bacteriological etiology as introduced by the great Pasteur. As one great triumph followed another it seemed, of course, that dual-phase etiology (an invader and a host) represented the ultimate in all disease processes. Having found a cause, an immunity producing method must follow. Such a concept has led to untold waste of energy in modern research.

The Patient Is Introduced to His Disease

This usually happens in the course of a health, an insurance or a general examination. It is unusual to know just how long the process or tendency has been present; we may estimate in a limited (malignant?) group approximately how long they will live. Unless we grasp something of the "fourth dimensional phase or features of etiology" our contact with hypertensives may be less that of a wise counsellor than of a futile fanatic attempting to steer our patients away from our own pet aversions, or to the espousal of ways of living quite unbearable either for strength of body or peace of mind. We should strive to make a sensible and accurate diagnosis, having in mind a full and sufficient survey leading to a judicious estimate of the patient's trend and organic adequacy. Thereafter, only minimal blood pressure readings should be taken and minor variations should be ignored. Let us think of blood pressure taking as we do of pulse and temperature estimates; or metabolic rates and blood sugar levels. These devisements do not betoken diseases, catalogued or charted by dots or numbers; obviously they become curves connecting a sequence of such dots. This Einsteinian thread intrudes itself and cannot be denied. Confusion presents itself constantly, likewise, in the matter of terms or designations. It may be worthwhile to interpolate what has been said many times before. Hypertension hastens wear and tear on the cardiovascular system and as an overwork phenomenon does increase the tendency to arteriosclerosis of the larger vessels; but this is the only connection between the two terms. Patients still treasure the terms "hardening of the arteries" and "enlargement of the heart." While hypertensive disease‡ may and does shorten some lives there is a good side to the picture, and the ledger, which deserves emphasis; and the terms we use in interpreting conditions may lose much of their menace by a softening that is well within scientific fact as well as sympathetic consideration.

Irving Fisher, some twenty years ago (in another connection entirely) said, "There is a breadth of life as well as length"; and to elucidate added, "There is no area in a straight line." Despite all the lamentable comments of life insurance actuaries and life extension institutes, far more than the average of essential hypertensives live a broad, productive, sthenic life. Not all fat people are happy nor lean ones dour. Recent studies show vasomotor instability among the lethargic and sluggish, but we lose perspective unless we hold to the mean and we must not allow weight of so-called authority or accumulation of information to divert us from what our years of contact and experience show. While the average person's life is shortened by what we call essential hypertension, I hold that the area of accomplishment of life is actually broadened.

We must further interpose that women, especially after fifty, deserve a special category in this discussion. Perhaps it is on account of their emotional and endocrine lability; possibly their "biological superiority"; a few might intimate their inherited ability to accept what fate assigns to them. They bear up under true essential hypertension much better than men. Whether the endocrine menopausal type so well discussed by David Riesman proves utimately to be separate and distinct from the conditioned folk of both sexes who from the earliest ages respond to specific tests of vasomotor irritability remains still to be proven. We know empirically that menopausal women with flushings and nervous perturbation have very often fared well as they ride over their endocrine break and in so doing add considerably to the reputation of certain therapy that happened along at the time. An endocrine factor is encountered in hyperthyroidism and a mechanical situation arises akin to that in aortic insufficiency, but that rarely confuses careful clinicians. More especial comment must be given to those episodes of hypertension concerned with the toxemias (with or without kidney damage) of pregnancy; and eclampsia happens to furnish an acute physiological break that is more than casually interesting and bears upon our management problem. To this I shall refer later.

---

†Hypertensive disease and migraine permit of rather interesting comparison. Weighing the constitutional and personality background predominantly seen where these conditions obtain, the sthenic hypertensive knows few restraints until late complications impose them; the migrainer suffers tormenting abridgements early in life but fits most gracefully into the fifth and sixth decades with a comforting sense of gratitude for relief, a spirit chastened but a body spared by an enforced caution in living.

‡The best current literature distinguishes clearly between arteriosclerotic and hypertensive cardiovascular disease. The position of the kidney in these two entities has led to confusion and overemphasis upon the nephritides.

What the Patient Thinks About

Too much has been recounted in popular literature about the will or the determination either to prolong or terminate life. For any acute illness, medical or surgical, where the process yields death or survival in quite immediate fashion, no great advantage is gained by attempting to secure more than passive acceptance of the doctor's efforts and the results soon speak for themselves. However, hypertension is one of many fields where it is indeed wise to sound the mental processes and conjurations of the patient himself. We know that he is greatly more interested in the prognosis than in any of the details of the diagnosis. Every new recruit to the army of hypertensives is most interested in how or when he is likely to die. Like the obviously indigent Celt who offered a sum running into four figures if he should know the place where he would die, asked why he was so anxious to have this enlightenment, he responded, "Begorry, I'd never go near the place!"

Some Statistical Data Concerning Hypertensive Disease and Autopsy Findings

Medicine in general, and Minnesota medicine in particular, has profited greatly by the careful observations and teachings in terms of the large autopsy material at our university under the direction of Professor E. T. Bell. A relatively large autopsy service in our Duluth institutions year by year adds support to Bell's statistics. From 60 to 75 per cent of essential hypertensive patients die a cardiac death; 12 to 15 per cent a cerebral accident sequence; 5 to 7 per cent die with renal insufficiency, and the rest die of miscellaneous events, not excluding the efforts of the automobile and the surgeon. However, these figures are not more than three-dimensional and lack the Einsteinian touch of time, since a great many would die a cardio-renal-encephalomalacic death if something else did not deny them that privilege by an earlier demise from tuberculosis, pneumonia, cancer and all other ills. Let us analyze these three divisions, first taking up the cerebral accident group, then the kidney, and finally the myocardiacs.

Patients and doctors both go wrong in failing to identify clearly the symptomatology and pathology that is clearly an accompaniment of the hypertension and what is not. To illustrate, "strokes" have been clearly identified by the public with "high pressures and hardening of the arteries." Emboli from heart disease, cerebral thromboses in normal tension folk, and hemorrhages in those with normal blood pressures, comprise a large percentage of all cerebral accidents, and remember that even in known hypertensives the total of cerebral accidents is less than 15 per cent. Dizziness,, numbness and tingling—what a lot of suffering and perturbation these cause where eyestrain, ear wax, anemia, insomnia and exhaustion states likely are the source!

Despite the detailed and diligent teaching in our schools, interns are still greatly puzzled over the kidney group; the meaning of "malignant hypertension"—how to distinguish this entity from chronic glomerular nephritis. The dissociation is made too difficult. The group is small and chiefly valuable to the general clinician because it has invited and now compels us to study closely and frequently the eyeground retinal changes. It is the only group within our study where diet (reduction of protein) has any excuse at all; and then only in the stage of the disease when the patient has not long to live anyway. Diet reduction for obesity is another matter. The term "hypertension, with vasospastic trends" would appear better than either the term "precocious or malignant hypertension." The term "precocity," of course, intimates and connotes the young individual (usually a male with a hereditary background) who begins early and runs a turbulent, stormy course.

There has been a most salutary development of interest and bid for coöperation between specialists of the eye and internists in lending their routine and research aid in eyeground study (retinoscopy). From the standpoint of perverted cardiovascular physiology it would seem helpful to attempt to bring together for consideration all processes productive of acute vessel spasm, even as we study fever, quite apart from its symptomatic value. This is one of my chief reasons for introducing into this discussion the intriguing but confusing disturbance, with or without associated kidney pathology, and designated as one of the toxemias of pregnancy, namely, eclampsia. Sufficient for a monograph in itself would be a review (including the various interpretations) of what are grouped under the term "the hypertensive encephalopathies." We have seen two such dramatic entities associated with hypertension, where the retinal changes and the spinal fluid estimations (cell count, et cetera) so closely approximated the picture of "encephalitis" as to be most striking. The most interesting feature pertaining to this attempt at collation is to draw attention to the fact that in eclampsia a reversal of the angiospastic trend follows spontaneous or induced delivery.. A possible total loss of vision may be prevented providing the process in the retinal vessels does not go on to anoxemic and nutritional deficiencies (Wagener) that cause degenerative sequences that are irreversible. This is the notable feature associated with the report of Drs. Brown and Adson where supralumbar anterior nerve root sections have not only dramatically changed the blood pressure readings in this severe "malignant type," but I understand the eyeground changes have been reversed also. This re-emphasizes the great importance of the mechanical vasospastic hyperirritable vasomotor control. It would not appear that such extreme surgery, resulting in such striking interference with "the natural oversights of our internal climate" will be widely attempted; but so far as I know it is the only method that has caused a delay in the deadly trend of this precocious group.[§] This would appear to be a fertile field for the physiologist to tie up his approach and instrumental measurements with clinical medicine and surgery; and accomplish currently and dynamically something comparable to what the necropsist and pathologist has been able to evaluate for us statically at the postmortem table. Physiologists, while dealing with kaleidoscopic fleeting sequences, have at least the advantage of successive observation; the necropsist has but one!

We come, then, to a large group that are potential myocardiacs[*] and furnish presently most of our cases of cardiac failure. It is no discredit to the plethora of students in this field (roentgenologists, electrocardiologists, cardiologists) to intimate that the heart itself has been "done to death." It is full time to encourage studies upon peripheral circulation, plasma and lymph formation and much more that has gradually followed upon the pioneering of Starling and Sherrington. Naturally, the excuse for so much primary cardiology is to be found in the great frequency with which "the non-valvular type deficiencies" are seen. Those attending many patients with heart failure will find hypertensive disease behind more than rheumatic disease, syphilis, arteriosclerosis and hyperthyroidism combined. In any case, the problem of the nutrition and oxygenation of the heart is the basic factor, and for diagnostic significance and prognostic outlook nothing is more of value than a correct estimate of the heart weight and size;[†] the relative proportions, right and left, may be fairly definitely surmised routinely.

[§] One might make an exception of the triumphant surgery done in certain vacillating hypertensives who give evidence and surgical proof upon exploration of certain types of suprarenal tumors. Their removal has given dramatic relief. Much has also been said recently about x-ray treatment over the suprarenals, intended presumably to lessen the normal activity of these glands.

[*] Another monographic subject is coronary disease; and a confusion of terms is notorious. Some physiological standards of efficiency should be set off against the pathologist's estimate of calibre shrinkage and intimal invasion. The latter figures of 70 per cent to 90 per cent showing coronary arterial damage in hypertensive disease are correct, but some with very sparing and limited pathology witness the most devastating thromboses; others laid down in concrete accompany senescence.

[†] Very large hearts, not readily explained by valvular or myocardial or chronic infarctive coronary disease, are likely hypertensive in origin. Some types of kidney shrinkage may induce considerable hypertension but the patient rarely lives long enough to have a very heavy heart. Naturally, congenital defects, pericardial adhesions and certain fatty hearts must be considered.

The Routine Treatment of Myocardial Failure or Exhaustion Not Included

I must again remind myself and my auditors that my subject is the management of the hypertensive factors in a disease that begins as a physiological perversion, and that only after varying periods of months or years does a contest develop between the hypermyotrophy of the media of the small arterioles and a process significantly similar in the heart itself, with the maximum process exhibited in the left ventricle. In this period of development, physiological compensation is easily maintained because of the natural lability of vital processes involved in capillary adequacy and cell metabolism. The so-called "body constants," like the Ten Commandments, may be tested and tried but not ignored; in other words, they survive their fracture. I have implied already that from the eugenic side I consider the hereditary avoidance through eugenic[‡] devisement of parenthood as a bit chimerical at this time. Therefore, it devolves that as far as hyperpiesis is concerned one field of endeavor is to attempt to prolong the period of physiological compensation and defer the organic episodes, fatal in tendency, mentioned previously. Well, we have for this effort a valuable ally in Nature. In fact, natural trends do it so well that all too little is left for us. Stated baldly, when in general the left ventricle fails from any source, and conspicuously from the coronary inadequacy plus gross hypertrophy of the heart, the outlook is bad. A limited life too often follows; the exceptions only prove the rule. It behooves us, nevertheless, to take no laissez faire attitude but fight hard to the finish. We may not be able to "cure the hypertensive disease," but we may do a great deal for "its complications."

Everything, therefore, points to the theoretical value of attempting to prolong to the utmost the stage of equilibrium or myocardial sufficiency. To anticipate the avoidable break requires all the foresight and ability for guidance demonstrable by the best of our guild. Many papers have been written upon the signals and signs of impending failure or distress. To me they are difficult to separate from like fatigue, numbnesses, insomnias, twitchings and what-not seen in other people without hypertension. Certain dyspneas (notably nocturnal orthopnea) stand out as such conspicuous reminders of a failing left ventricle that their importance cannot be overestimated. Unhappily, this is not an early symptom. In hypertensives it is not usual to have anginal pain associated with it, but "stenocardial oppression" on effort is often seen.

While I have foresworn and put aside the question of the therapy for the failing heart I must admit that you would scarcely dare not to use digitalis; but as a "sovereign remedy" it has made its reputation elsewhere, notably in the right-heart strain associated with mitral disease. Many would agree with Christian that "tonic doses of digitalis" should be given to all true or threatened myocardiacs. The doubt arises as to when to begin its exhibition, and few patients care to have any medicament exhibited for indefinite periods unless symptomatic betterment is obvious. Therapists no longer argue about the "diuretic properties" of certain digitalis preparations but proceed to take advantage at once of the epochal "physiological diuretics." A better understanding of capillary adequacy, osmotic interchange and physiological chemistry is no longer entirely foreign to the clinician's consciousness. Some perusal of this physiological literature helps to explain the decisive therapeutic value of expensive drugs—xanthin,[§] purine derivatives—of which theobromin (with or without a barbital derivative) is so valuable that its cost is unfortunate. Theophyllin (euphyllin) has the advantage that it may be used by rectum or intravenously.

Factors Promoting Equilibrium

Certainly the keynote of helping to maintain the status of cardiovascular equilibrium is to be sought in the many and diverse aids furthering relaxation. As to drugs, I have no confidence at all in specifics. Calcium bromide* is my chief personal ally, with certain barbiturates and sodium amytol next in service. The field for the fusser—the eradication of foci of infection, or dieting except for obesity—is very limited. We should be called upon (but seldom are) by men entering upon enterprises apt to be heavy and demanding too much strain. In general, unless they are definitely out of equilibrium they stand the usual surgical procedures very well. I need not attempt any detail as to the technic we should adopt to direct the mental and physical orbits of our hypertensives.

[‡] "Genes and jeans" come into conflict. The one may carry high potential possibilities for posterity; the others contain nothing adequate to finance the economic adventure of matrimony. Parents may come some time to have more influence than they have presently. Theoretically, at least, two people presumably conditioned to hypertension should not marry.

[§] Tissue (pancreas) extracts by hypodermic, recently suggested and satisfactorily employed in peripheral vascular disease (Buerger's) point to the likely relationship of plant and animal extracts and these purine derivatives in their circulatory effect. Drinker and Field (Lymphatic, lymph and tissue fluids, Williams and Wilkins, Baltimore, 1933), excerpted therefrom: "Of the various things that do not damage capillaries and still promote tissue cell drying, various solutions of dextrose have been most exemplified therapeutically. This sequence is definite: cells lose their water to the tissue fluids. The increased molecular concentration promotes through osmotic pressure further formation of tissue fluid and hence promotes lymphatic drainage. Of all other substances that promote this through toxic or tissue irritant or damage, practically all of them are extracts or from tissue substances containing peptone."

The above statement is very illuminating and bears upon the countless substances of plant and animal origin (richly nuclear material) which have been advised and suggested to accomplish various things, including a depression of blood pressures. The manner of their pharmaceutical influence does not exclude various degrees of what is known as "shock therapy."

Detail interference is not to be compared with the kindly planting of the seeds of suggestion. Some of these may grow to fruition in pleasing and solacing avocations. Ennui suffices not for hypertensives. Of man's five instinctive trends the hypertensive subject is weakest in his abuse of ambition and seeking for bettering his station in life. He is the "go-getter." He places overmuch confidence in intellect and its search for fact. He is soured when the "facts of today become the fancies of tomorrow." His esthetic faculties are dwarfed and he is patronizing toward beauty and the arts or music and poetry, rather than enslaved by what so easily becomes a diverting tyrant. The question of morals leads him all too easily to the Nietzschian philosophy of success and renders him less "socially adequate" than he thinks he is. His desire to make others conform to his tempo often makes him not the best of companions even for himself. We usually start too late to divert him successfully. Where given an earlier opportunity we may offer suggestions which may assist him to grow old gracefully. It should help him to be taught that there is much in life to be gained by cultivating friendship and contemplation. Perhaps the gist of it all is "to avoid taking himself too seriously."

---

*It is fair to presume that the most effective drugs ease down the vasomotor center and thus lessen the universal load. The nitrites are truly evanescent, and drugs like sodium sulphocyanate and bismuth subnitrate, used empirically and given considerable credit by some—all such have fallen into disuse.

LYSOZYME: ONE OF THE NATURAL DEFENSE FACTORS OF THE EYE

ANDERSON C. HILDING, M.D., Ph.D.

Duluth, Minnesota

SINCE the earliest days of ancient medicine, all sorts of magical healing powers have been attributed to the body fluids and excretions. Modern scientific medicine also makes some remarkable claims concerning the properties of the body fluids, such as, for instance, those of the internal secretions and the antibodies of the blood. But we no longer consider such powers as occult or magical because our understanding of them is somewhat better. One of the latest of the body fluids to come into the limelight on account of its natural antiseptic properties is the lachrymal fluid. The material that makes the tears antiseptic was discovered by Alexander Fleming in 1922. He called it "lysozyme." Since 1922 there have been at least twenty-five articles written about it, but because almost all of these have been in foreign journals, we have not become familiar with the substance. I shall summarize very briefly some of the facts that have been learned about this interesting material. I hope that you will pardon a rather didactic type of approach to the subject. It is difficult to make it anything else.

Lysozyme may be defined as an enzyme which is normally present in most of the body tissues and fluids and which has the property of dissolving certain kinds of bacteria. Its occurrence is widespread and by no means confined to man. It is found in a number of the lower animals, in varying amounts in eggs, and also to some extent in certain vegetables, such as the turnip.

In the fluids of the human organism it reaches its highest concentration in the tears and is probably largely responsible for the nearly-sterile condition of the conjunctival sac. The content in nasal mucus and sputum is also high. On the other hand, there is said to be none in either spinal fluid, sweat, or urine.

Among the tissues, the greatest concentration is found in cartilage. Leukocytes also have a very high content according to Ridley,[26] who has estimated their content to be at least as great as that of the tears.

Some of the chemical properties of lysozyme have been fairly well worked out. It seems definitely settled that it is an enzyme. It has been purified to a high degree by Wolff,[29] who obtained it from egg white. When dry, it is a yellow amorphous powder that dissolves readily in water and does not give a protein reaction by the usual test. It filters very poorly and dialyzes poorly or not at all. For this reason it is thought to be a colloid when in solution. It has been kept for two years in dried egg white and for one year in acetone and alcohol.

Lysozyme acts best at a fairly high temperature, much above body temperature. Fifty-five degrees C. is the optimum (130 F.). Boiling destroys it if it is in a neutral solution, but if the solution is slightly acid it will tolerate a boiling temperature for a few minutes. One of the most interesting chemical characteristics is that lysozyme will not act in the absence of a salt. Any one of a number of salts may be used in the solution. Too much salt stops the action: 0.5 per cent is the optimum; 2 per cent retards the action; and 5 per cent inhibits it altogether. The reaction has a marked influence. It acts best in a neutral solution. A slight change either way retards its action. Acid, however, is tolerated much better than alkali.

Wolff[29] is positive that it is not an antigen. He and other workers also agree that it is distinct from bacteriophage. Points of difference are as follows: Lysozyme acts immediately, whereas phage requires an incubation period of many hours; lysozyme acts on both living and dead bacteria, whereas phage acts on the living only; lysozyme acts at a somewhat higher temperature than phage.[16]

The effect on bacteria depends upon the particular strain used. There may be no effect at all, or growth may be inhibited, or the bacteria may be killed but not dissolved, or the bacteria may be destroyed and completely dissolved. With certain susceptible strains complete solution or lysis takes place in unbelievably dilute solutions. Egg white has been reported to be effective in a dilution as high as 1:60,000,000 and tears as high as 1:512,000.

The concentration of lysozyme present is estimated by means of this lytic effect on bacteria. Most workers have used the organism described by Fleming.[9]

Lysozyme is most effective against the so-called non-pathogenic bacteria and is much less effective against the pathogens. It is especially deadly to the bacteria which are ordinarily found in the atmosphere and is found in greatest concentration in those secretions most exposed to the air, namely, tears and nasal mucus. Micrococcus lysodeikticus, which Fleming cultured from the atmosphere, is destroyed and dissolved by tears or nasal mucus in thirty seconds. Of 104 other strains taken from the air and tested by Fleming, 75 per cent dissolved more or less completely in 1:100 sputum. Twenty-eight per cent were completely dissolved in one hour. Of the bacteria found in the human body, intestinal streptococci are most susceptible and the B. coli group are least susceptible. This explains one of my own experiences. Some years before hearing about lysozyme, I tested some nasal mucus for the presence of a possible rapidly-acting antiseptic. The method was to watch bacteria suspend in mucus under the microscope. Thinking that motile ones would be easier to judge, I selected B. coli and B. typhosis. The selection could not have been more unfortunate as far as lysozyme is concerned, because these belong to the most resistant group of any. Needless to say, the results of the experiment were nil.

The lytic power of lysozyme is not lost through use (Fleming,[10] Nakamura[24]). A sample may be used repeatedly without losing its potency.

On the other hand, bacteria that have been exposed to lysozyme and survived become very highly resistant and this resistance persists through numerous subcultures.*

The action of artificial antiseptics on lysozyme is rather startling. They have not been tested very extensively, but it appears from Fleming's and Cavka and Prica's work that some of the common antiseptics are much more destructive of lysozyme than they are of bacteria. That is the case, for instance, with chloromine T. com-

---

*This may explain the difference between two microbes that have been in the limelight a great deal in recent years, B. abortis and B. melitensis. B. abortis is the cause of abortive fever in cattle. The organism of undulant fever in man is B. melitensis. It has been shown that these two organisms are identical, yet they differ in this, that B. abortis is destroyed by lysozyme and B. melitensis is not. The latter seems to be nothing more than a strain of the former which has become resistant to man's defenses and can therefore invade.

TABLE I

February 11, 1933	Dilutions	P. M. 9:38	P. M. 9:50	P. M. 10:15	P. M. 10:40	P. M. 11:15	A. M. 12:40	A. M. 3:00	February 12, 1933 A. M. 9:30	A. M 5:30
Experiment Begun 9:05 P. M.										
Tears	1:10	50	75	100	100	100	100	100	100	100
	1:20	?	50	80	100	100	100	100	100	100
	1:40			50	75	100	90	100	100	100
	1:80				?	50	75	100	100	100
	1:175			?	50	60	75	100	100	100
	1:325								50	75
	1:650							?	60	90
	1:1300									
Experiment Begun 9:03 P. M.										
Nasal Mucus	1:10	50	75	100	100	100	100	100	100	100
	1:20	?	50	75	100	100	100	100	100	100
	1:40				75	80	100	100	100	100
	1:80				50	80	90	100	90	90
	1:175					50	50	66	50	75
	1:325					50	60	90	100	80
	1:650									50
	1:1300								60	75
Experiment Begun 9:01 P. M.										
Aqueous Humor	1:10					50	60	75	100	100
	1:20					?	40	50	30	50
	1:40						40	60	66	100
	1:80					?	50	75	66	75
	1:175									50
	1:325									
	1:650				50	50	90	100	75	100
	1:1300									50
Experiment Begun 8:45 P. M.										
Lens Matter	1:10					50		?		
	1:20									
	1:40					?				
	1:80							?		
	1:175					50	75	50		
	1:325									
	1:650					25	50	50		
	1:1300									
Experiment Begun 8:56 P. M.										
Vitreous Humor	1:10					?	?			
	1:20									
	1:40									
	1:80									
	1:175									
	1:325									
	1:650						50	80		
	1:1300									

Comparative lytic powers of tears, nasal mucus, and aqueous humor, lens matter, and vitreous humor. The dilutions of the substances tested are given in the left hand column, and the hours when the tubes were examined, across the top. The other figures represent the percentage of clearing of the bacterial suspension due to lysis of the bacteria by lysozyme. The suspension was made from bacterial strain No. 9. The dilution 1:10 in both tears and mucin cleared completely in about one hour. The tears cleared the 1:175 dilution in about six hours, and the mucus cleared the 1:80 dilution in about the same time. The first tube of aqueous (1:10) is the only one of the tubes containing any one of the three intraocular materials that cleared completely and that required twelve hours.

monly used in gargles. This inhibits the action of lysozyme in a dilution of 1:32,000, whereas it takes a hundred times as much to inhibit the growth of staphylococcus in blood. All antiseptics do not have this destructive effect.

Ultraviolet light, which was in rather general vogue just a short while ago in treatment of colds, is very destructive of lysozyme (Hallauer[15]).

Several of these workers feel certain that lysozyme is one of the powerful natural defense agents against bacterial invasion. Some of the strongest indication that this is so comes from studies on the eye.

There are at least three reports upon the relation of lysozyme to the eye and its diseases, namely, those of Ridley, Oluf Anderson, and Cavka and Prica. The lytic effect or titer of the

TABLE II

Strain 12 April 4, 1933	Set up at	1:35	2:00	3:00	4:30	5:30	April 5, 1933 10 A. M.
Tears	1:11	75—	75	100	100	100	100
	1:45	50	75—	100	100	100	100
	1:180	?	50	75	75+	75	100
	1:725	?	?	50	75	75	100—
	1:2890			?	50—	50	75
Aqueous	1:11		?	?	?	?	50
	1:45			?	?	?	75
	1:180				?	?	75
	1:725			?		?	50
	1:2890						
Lens	1:11						
	1:45						
	1:180			?	?	?	?
	1:725						
	1:2890						
Vitreous	1:11						
	1:45						
	1:180						
	1:725						
	1:2890						

A test of the comparative lytic power of tears, aqueous, lens matter, and vitreous in five different dilutions. The dilutions of the substances tested are given in the left hand column and the hours when the tubes were examined, across the top. The other figures indicate the percentage of clearing of the test tubes due to lysis of the bacteria in the suspension. Strain No. 12 was used for these tests.

tears varies with each author, since each used a somewhat different technic. All found it normally very high. With micrococcus lysodeikticus complete lysis took place in dilutions varying from 1:40,000 to 1:60,000.

All three of these studies report a moderate to marked reduction of the titer in a number of external eye diseases. It is most marked in xerophthalmia. In this disease it drops to a small fraction, around one-sixth normal (Anderson[1]). Anything causing epiphora, even foreign bodies, cause a moderate drop. Five cases reported by Ridley titrated at 45 per cent of normal. This may be partly a dilution phenomenon. Conjunctivitis from almost any cause exhibits a drop of 30 to 60 per cent. This drop does not occur in chronic conjunctivitis such as that accompanying chronic dachryocystitis. In this condition the titer is very apt to be normal. A moderate fall has been found to accompany trachoma, corneal ulcer, hypopyon ulcer, phlyctenular conjunctivitis, phlyctenular keratitis and deep keratitis. One patient with a foreign body in the eye suffered also from a chronic tear sac infection. When the titer fell with the epiphora, an infection of the conjunctiva developed. When the titer rose the conjunctiva cleared up, but the tear sac remained as before. Neither Ridley nor the others make it clear if the lysozyme titer falls before or with these external diseases and whether the rise in titer precedes or accompanies the healing process. It seems to me that this is a very vital point, if the fall in lysozyme content is to be taken as an etiologic factor.

The etiologic rôle of a reduced lysozyme content of the tears in xerophthalmia is much more complete and convincing than in any other eye disease. It is common knowledge that xerophthalmia results from vitamin A deficiency. Findley (quoted by Oluf Anderson) has demonstrated that the lysozyme titer falls in vitamin A deficiency. Pillat, working in China, has shown that in vitamin A deficiency, the cornea is full of growing bacteria some time before the xerophthalmia develops. Findley has delayed the appearance of xerophthalmia in vitamin A deficient rats by simply instilling human tears into their eyes. Oluf Anderson reports two twins with vitamin A deficiency and xerophthalmia. One showed keratomalacia on admission; the other was more incipient. In the former the lysozyme titer was down to one-eighth normal and in the latter to one-sixth. There was no suspicion of dilution here because there was very little tear production in either. As soon as vitamin A was fed, the titer began to rise in both and reached normal in four days in the severer case and three days in the other. The former developed complications because of corneal perforation, but both recovered from the xerophthalmia. The author implies but does not make entirely clear that the rise in titer preceded the clinical improvement. If so, it seems fairly definite, combining these various reports, that the fall in the lysozyme content of the tears is the determining factor in the development of infection and keratomalacia in xerophthalmia.

These reports by our European confreres stimulated me to make some studies of lysozyme in relation to certain diseases of the eye and nose. As yet this work is in its infancy and I shall content myself with reporting only a few experiments on the eye at this time.

It has been said that the lens matter of the eye is very easily infected as compared, for instance, to the vitreous humor. In order to determine if this difference might be due to a difference in lysozyme content, a series of comparative determinations of lytic power were made on a group of five different substances. These were as follows: My own tears and nasal mucus, and the lens matter, vitreous, and aqueous humor from fresh pigs' eyes.

Method.—The method used for determining lytic power was simply to mix known dilutions of the material to be tested with saline suspensions of strains of bacteria known to be susceptible to lysozyme. Two different strains of bacteria, called No. 9 and No. 12, were used.

The tears were aspirated from the conjunctival sac after instilling a drop of lemon juice. There was no special difficulty in obtaining the nasal mucus. The other materials were obtained from three pigs' eyes. The eyes were thoroughly washed and the lenses extracted as in a cataract operation. The aqueous from all three was collected in one dish as it flowed out past the knife. The three lenses were washed and then ground up together. A separate incision was made far back on the sclera in order to obtain vitreous fairly free of aqueous. The vitreous also from all three eyes was mixed. Thus the samples of pig material tested represented mixtures from three eyes.

Three sets of determinations were made on three different days. In two, each of the five materials were tested in eight different dilutions, using strain No. 9. The results of one of these sets of determinations is given in Table I. In the third, strain No. 12 was used and the mucus was omitted (Table II).

After the dilutions had been made and the bacterial suspension added, the test tubes were incubated and examined for lysis from time to time as indicated in the tables. The degree of lysis was estimated in the first two sets of determinations, simply by judging its density with the eye as compared with the control of full strength bacterial suspensions. In the third set of determinations (Table II) a battery of eight control tubes of varying bacterial content was used for comparison.

Results.—As was to be expected, the lytic power of tears was the greatest. Nasal mucus ran a close second. Aqueous seemed to be feebly lytic but this was not without question. Vitreous humor and lens matter appeared to be devoid of lytic power. Some of the lower dilutions showed partial clearing that was not consistent. As far as these experiments go, one must conclude that aqueous contains little, if any, lysozyme, and lens and vitreous none at all, while tears and nasal mucus, on the other hand, contain a great deal.

Summary.—There is a natural antiseptic, chemically an enzyme, that is found widespread through the body fluids and tissues. It has the power of destroying and dissolving certain groups of bacteria even when highly diluted. It is found most abundantly in tears, very abundantly also in nasal mucus. Its purpose in these two secretions seems to be to protect us from the atmospheric bacteria for which its is very deadly. The pathogenic bacteria are inhibited in their growth by it but are not necessarily destroyed. The lysozyme content of tears falls moderately in a number of the acute external diseases. In fact, it falls during any epiphora. That this has any etiologic significance is not thoroughly established. In vitamin A deficiency and xerophthalmia, however, there is a very marked decrease in lytic power that seems fairly definitely to have an etiologic importance in the development of infection and keratomalacia. The three humors within the eye showed little or no lytic power when tested, and therefore, probably contain little or no lysozyme.

Bibliography

1. Anderson, Oluf: Om Lysozymets Forhold ved Xerophthalmmi. Hospitalstidende, 75:1029-1037, 1932.
2. Anderson, O.: Untersuchungen über das Lysozym aus dem Micrococcus lysodeicticus. Ztschr. f. Immunitätsforsch. u. exper. Therap., 70:90-103, 1931.
3. Anderson, Oluf: Decreased prophylactic strength in xerophthalmia. Acta Paediat., 14:81-91, 1932.
4. Bordet, M.: Contribution à l'étude du lysozyme. Compt.-rend. Soc. de biol., 99:1252-1254, 1928.
5. Bordet, M.: Essais d'extration du lysozyme. Comp.-rend. Soc. de biol., 99:1254-1256, 1928.
6. Calleria, C.: Lysozyme. Boll. d. Soc. Med. Chir. Pavia, 46:699-722, 1932.
7. Cavka, V., and Prica, M.: Über Lysozymwirkung in normalen und pathologischen Augensekreten. Arch. f. Ophth., 121:740-755, 1929.
8. Corper, H. J.: Lysozyme and tuberculosis. Am. Rev. Tuberc., 25:59-66, 1932.
9. Fleming, Alexander: On a remarkable bacteriolytic element found in the tissues and secretions. Proc. Royal Soc. Med., B 93:306-317, 1922.
10. Fleming, Alexander, and Allison, V. D.: Further observations on a bacteriolytic element found in tissues and secretions. Proc. Royal Soc. Med., B 94:142-151, 1923.
11. Fleming, Alexander: Lysozyme—A bacteriolytic ferment found normally in the tissues and secretions. Lancet, 216:217-220, 1929.
12. Fleming, Alexander: Lysozyme. Proc. Royal Soc. Med., 26:71-84, 1932.
13. Goharl, M. A.: Lysozym. Zentralbl. f. Bakteriol. Parasitenk. u. Infectionskr., 119:240-244, 1930.
14. Goldsworthy, N. E., and Florey, Howard: Some properties of mucus with special reference to its anti-bacterial functions. British Jour. Exp. Path., 11:192-208, 1930.
15. Hallauer, C.: Über das lysozym. Zentralbl. f. Bakteriol. Parasitenk. u. Infectionskr., 114:519-529, 1929.
16. D'Herelle, F.: Bacteriophage and Its Behavior. Williams and Wilkens Co., Baltimore, page 299, 1926.
17. Hewitt, L. T.: Effect of lysozyme on oxidation-reduction potentials of Micrococcus Lysodeikticus cultures. Biochem. Jour., 25:1452-1457, 1931.
18. Heymans, M.: Contribution a l'étude du lysozyme. Arch. internat. de. med. exper., 3:223-235, 1927.
19. Hoder, T.: Does bacteriolytic power of lysozyme bear any relation to action of immune bodies? Ztschr. f. Imm. u. Exp. Therap., 70:457-458, 1931.
20. Jermoljew, L. W., and Bujanowskaja, I. S.: Nature of lysozyme. Zentralbl. f. Bakteriol. Parasitenk. u. Infectionskr., 122:267-270, 1931.
21. Kigasawa, T.: Antigenic properties of lysozyme. Ztschr. f. Immun. u. Exp. Therap., 57:146-152, 1928.
22. Kimura, S.: Untersuchungen über Lysozymwirkungen im Tierkörper. Arch. f. Hyg., 96:277-288, 1925.
23. Kopeloff, N., Harriss, M. M., and McGinn, B.: Lysozyme in saliva. Am. Jour. Med. Sci., 184:632-673, 1932.
24. Nakamura, Onari: Über Lysozymwirkungen. Ztschr. f. Immun. u. Exp. Therap., 38:425-447, 1923-24.
25. Penrose, L. S.: Lysozyme content of saliva in psychotics. Lancet, 2:289-690, 1930.
26. Ridley, Frederick: Lysozyme: An anti-bacterial body present in great concentration in tears, and its relation to infection of the human eye. Proc. Royal Soc. Med., 21:1495-1505, 1928.
27. Rosenthal, L., and Leiberman, H.: Rôle in development of intestinal flora of the new born infant. Jour. Infect. Dis., 48:226-235, 1931.
28. Suranji, Ludwig: Über das Lysozym. Ztschr. f. Immun. u. Exp. Therap., 49:166-179, 1927.
29. Wolff, L. K.: Untersuchungen über das Lysozym. Ztschr f. Immun. u. Exp. Therap., 50:88-100, 1927.

Note.—The article from Jugoslavia, by Cavka and Prica, came to my attention after this work had been done. These authors made a number of determinations on the aqueous and lens of man but none on the vitreous.

THE USE OF LIVING SUTURES IN THE REPAIR OF ABDOMINAL HERNIAS*

JAMES C. MASSON, M.D.

Rochester, Minnesota

THE repair of congenital inguinal hernias in cases in which patients were children or young adults has for many years been considered very satisfactory, and the published statistics from hospitals where large numbers of young patients are operated on for hernia leave little to be desired, as most reports indicate a recurrence of less than 2 per cent. On the other hand, postoperative hernias, recurrent hernias, direct inguinal hernias, sliding hernias, and large indirect inguinal hernias among elderly patients always have been considered real surgical problems with a high percentage of unsatisfactory results. During the World War, however, a very large number of healthy young men were operated on for indirect inguinal hernia, and I think the members of the medical profession as a whole were surprised at the number of recurrences that were noted, for it was known that the surgeons in the army hospitals were competent.

---

*From the Division of Surgery, The Mayo Clinic, Rochester, Minnesota. Read before the Minnesota State Medical Association, July 16, 1934.

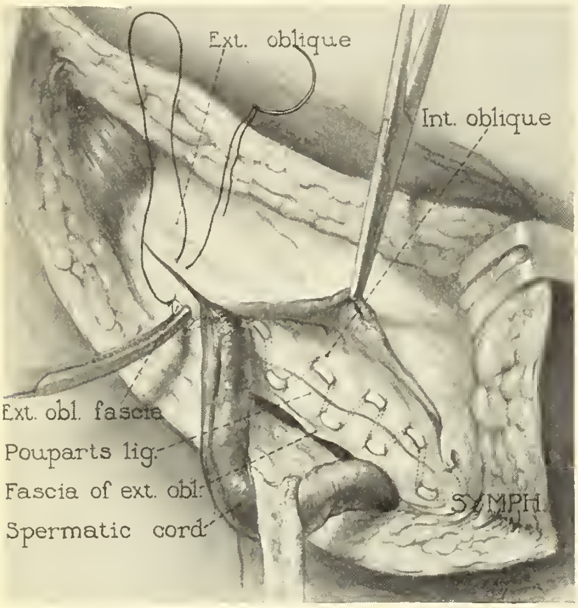


Fig. 1. Use of fascia lata in repair of inguinal hernia.

Many different technics and suture materials have been advised at different times for all varieties of hernia. This in itself indicates that no one method or suture material has been entirely satisfactory. At various times and by different surgeons filigrees of silver wire have been advised to bridge the gap through which the hernia passes. Nonabsorbable suture material, such as different kinds of wire, silkworm gut, silk, and linen, have been used extensively by some. Absorbable suture materials, such as catgut, kangaroo tendon, ox tendon, and so forth, are used by most surgeons at present. Different irritating solutions are injected by some surgeons with the idea of closing the hernial opening with scar tissue. Occasional cases are seen in which paraffin has been injected by some pseudo-surgeon.

In 1901, McArthur suggested using pedunculated strips of the aponeurosis of the external oblique muscle in place of ordinary suture material in the plastic repair of inguinal hernia. Apparently the method was used only by a few surgeons. Reports on the method, however, have been that results are entirely satisfactory, and examination of tissue at necropsy when the patient has died of a condition unrelated to hernia has showed definitely that the transplanted tissue lives and is firmly united to all tissues through which it passes. Infection is no doubt responsible for many failures following operations for hernia but, when living sutures are used, there is probably less danger than when foreign material is used.

In 1923, Gallie and LeMesurier, after carefully verified, experimental work, suggested the use of living sutures taken from the fascia lata of the patient himself, and in more recent papers they have been able to report most excellent results following the use of this material, not only in all types of inguinal hernia, but in the huge, postoperative variety of hernia and also in umbilical and femoral hernias. I have been impressed with the value of this type of suture material and have used it extensively in recent years.

I will not have time to go into the experimental work of Gallie and LeMesurier, but suffice it to say that they found that "pedunculated or free transplants of fascia or aponeurosis, if placed in such a position that they receive an adequate supply of lymph, continue to live unchanged." They also found that the tensile strength of the sutures remained constant and that they neither stretched nor contracted. As the result of passing through a needle hole in the tissues, the strips assume a more or less rounded form and, on cross section, closely resemble a tendon.

For several years, I have been using a modified McArthur technic for closure of the inguinal canals in indirect hernias. After high removal of the sac, a single strip of fascia is used, ¼ inch (0.7 cm.) wide, which is taken from the edge of the opening in the aponeurosis of the external oblique; the strip is left attached to the spine of the pubis. The inguinal canal is closed with a running mattress suture, behind the spermatic cord. A good hold is taken in satisfactorily strong tissue on the medial side, and, if necessary, stitches are placed in the rectus muscles in closing the lower part of the canal. On the lateral side a series of good catches is secured in the inguinal ligament. Care is taken to avoid tearing by placing sutures at varying distances from the free, recurved edge of the inguinal ligament.

In case there is very poor development of the internal oblique and transversalis muscles in the region of the lower half of the inguinal canal, it is often impossible to approximate any tissue from the inner side of the inguinal canal to the inguinal ligament without undue tension (Fig. 1). In such cases this space may be filled with a filigree of fascia made from sutures taken from the fascia lata of the thigh, in much the same way that a hole in a sock is filled with yarn in darning. Any attempt to fill the defect by drawing the tissue together under tension will predispose to cutting of the sutures and to failure. I like to make fairly tight closure of the internal abdominal ring and further to strengthen the closure by carrying the aponeurotic suture around the medial side of the ring and anchoring the suture into the inguinal ligament above the cord. The danger of interfering with the circulation in the spermatic cord is not so great as some surgeons seem to believe. Postoperative atrophy of the testis results, in most cases I am sure, from injury to the spermatic artery at the time of operation. In the majority of cases I like to bring the aponeurosis of the external oblique muscle beneath the cord also, as it adds strength to the weakest part of the closure; for this purpose I generally use number 2 chromic catgut. Another strip of fascia lata can be used, and this is advisable in the more difficult cases.

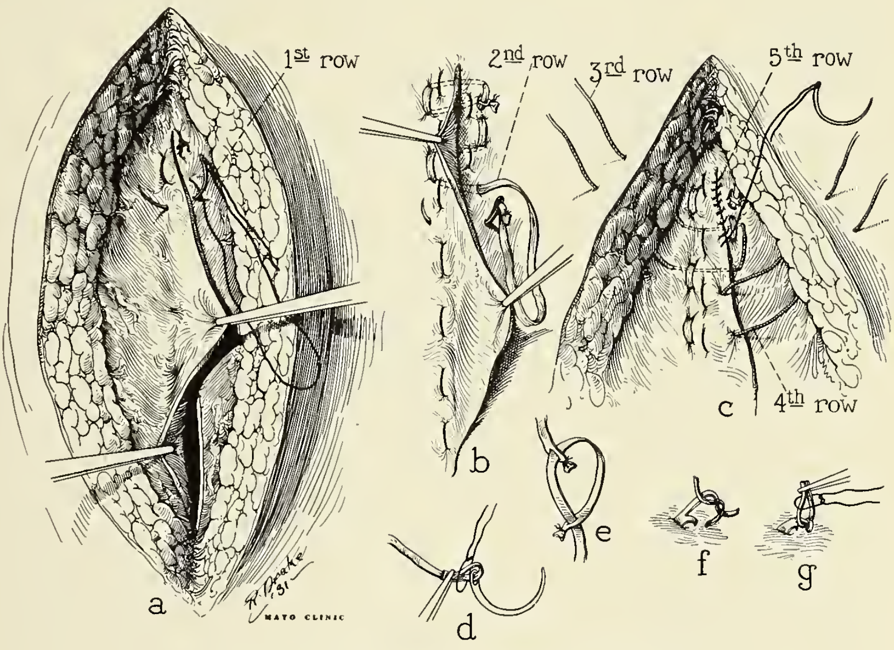


Fig. 2. Repair of postoperative hernia with fascia lata.

In the repair of postoperative and umbilical hernias, I am very partial to some form of plastic overlapping (Fig. 2). It is seldom indeed that all the tissue covering the hernia is valueless as repair material and, in a majority of cases, I am able to save sufficient tissue to overlap one side on top of the other in such a way that the scar tissue from one side reaches the muscle on the other, and vice versa. This double layer, consisting more or less of scar tissue, would in itself probably be sufficient to stand the strain of ordinary intra-abdominal pressure in many cases, especially if the hernia follows a wound in the upper half of the abdomen. However, if a patient is obese, or if the hernia occurs in the lower part of the abdomen, some additional support is necessary to withstand increase in the intra-abdominal pressure which is sure to result from sneezing, coughing, straining at stool, and so forth. This support, I feel, is satisfactorily obtained by using strips of fascia lata as running mattress sutures across the weakened region, taking frequent bites into the imbricated hernial sac, and reaching well past the sides of the hernial opening into normal tissues. In many cases it is also advisable further to strengthen the closure by running a few sutures of fascia at right angles to the others, catching into them whenever possible. In some cases of small postoperative hernia, it is possible to replace the hernial sac without opening it and to make secure closure by approximating the edges of the opening with living sutures, or to close the gap between the edges with a basket-weave type of closure, using strips of fascia lata, some sutures running transversely and others longitudinally. I do not think this replacement without opening is a safe procedure, however, for large hernias, or when loops of intestine are adherent in the sac, because of the danger of obstruction as a result of changed relations. For hernia following incisions low in the median line, when there has been considerable loss of muscle close to the pubis, and approximation cannot be obtained without a great deal of tension, it is frequently advisable to fill the gap with a solidly interwoven mat of fascia.

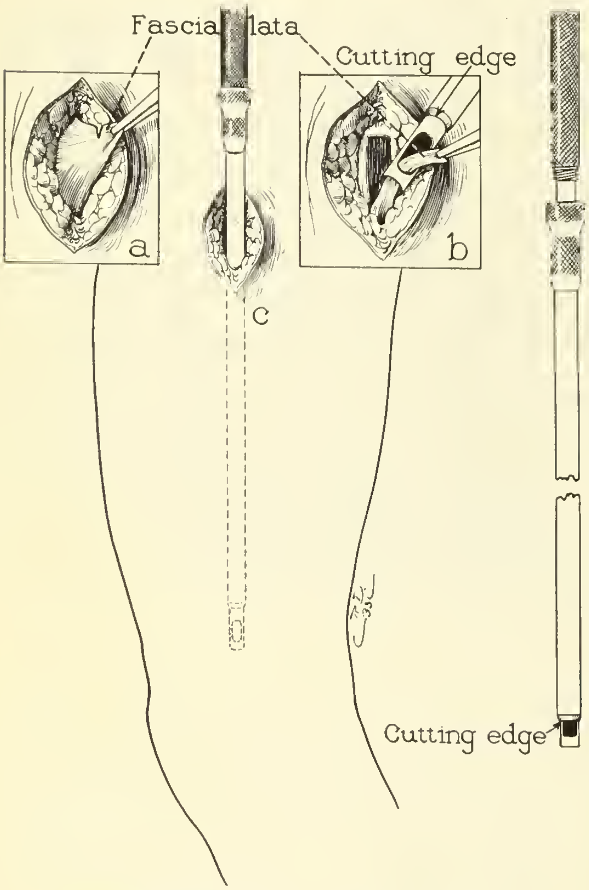


Fig. 3. Stripper used for obtaining fascia lata in repair of hernia.

In all operations for hernia, especially when the hernia is large and a considerable portion of intestine has become accustomed to remain outside the abdomen the greater part of the time, spinal anesthesia is of special benefit to both patient and surgeon, on account of the excellent relaxation of abdominal muscles. The operation then can be completed with a minimal amount of trauma to the abdominal viscera.

The ordinary closure of the crural canal for femoral hernia is not satisfactory, and it is surprising that there are not more recurrences following this method of closure. The crural canal is funnel-shaped, with the large end of the funnel pointing downward; in the ordinary closure, the pectineus muscle is pulled up into the canal thus blocking the outlet but doing little or nothing to prevent a new hernia starting at the inlet. What probably happens in most cases is that a preperitoneal tag of fat does descend into the upper part of the canal but adheres there and effectively holds back the hernial sac. By the use of living sutures, I feel that the canal can be much more effectually blocked. I have used the method in only a few cases of the kind mentioned, but I think it is indicated in all cases in which there is a large crural canal. The hernial opening is closed simply by carrying several stitches (using one living suture about 8 inches, 20 cm., in length) from the upper part of the pectineus muscle up through the canal and through the aponeurosis of the external oblique muscle just above the inguinal ligament. No attempt is made to approximate the tissues; the fascia simply blocks the canal. If this technic is used, it is necessary to make only a vertical incision about 2.5 or 3 inches (6.5 or 7.5 cm.) in length directly over the hernia, and another short incision in the thigh to get the strip of fascia.

With umbilical hernias, I always enlarge the hernial opening out to the edge of the rectus muscle on each side and then do a plastic, overlapping closure, as advised by Dr. W. J. Mayo, bringing the peritoneum of the upper flap, after removing any adherent fat from it, into direct apposition with the external sheath of the rectus muscle on the lower flap, which has been thoroughly cleaned of fat and scarified; I use twenty-day chromic catgut and two to four tension sutures of silkworm gut. This method gives excellent results. In most cases, however, I am sure the addition of living sutures taken from the fascia lata will greatly strengthen the closure; they should be used in exactly the same manner as was suggested for postoperative hernia.

One serious objection to the use of fascia lata as a suture material has been the extra time required for operation. Gallie suggested making an incision on the outer surface of the thigh, practically as long as the sutures to be removed. In order to save time, he advised having one surgeon prepare the aponeurotic sutures and another operate on the hernias.

About a year ago I perfected an instrument made of two tubes of steel (Fig. 3). The inner tube is slightly longer than the outer one and has an opening in one side, close to the lower end, through which the upper end of a strip of fascia is threaded. The outer tube, which has a cutting edge on its lower end, is used to cut the fascia free. This instrument has been very satisfactory and saves considerable time. After the strip of fascia has been obtained, it can be subdivided into three or four separate sutures to be used in the repair of the hernia. While one is being used, the others can be retained within the incision that has been made in the thigh, to keep them moist and warm. By this technic very little extra time is taken in securing the living sutures or in closing the wound.

Gallie's technic of using the sutures on a heavy, short needle with a large eye, and tying them securely to it, has been very satisfactory. On account of the slippery nature of fascia it is practically impossible to tie it in the ordinary way and, although it is very strong on a straight pull, it splits in a longitudinal direction very easily. For this reason the free end is securely tied with silk or chromic catgut and, after a single stitch has been taken in solid tissue, close to the edge of the hernial opening, the needle is carried through the suture itself, close to the ligated end, to form a slip knot and firmly to anchor the suture. When all of one piece of suture material has been used, another can be joined to it by tying the free ends with silk, to prevent raveling of the fascia, and then by stitching the second piece through the end of the first and locking it there. Sufficient fascia for practically any hernia can be obtained from one thigh, but if necessary both thighs may be used. Probably the simplest and, I am sure a satisfactory, way to end the suture is first to ligate it close to the free end, with silk or catgut, and then to secure it to good muscular or aponeurotic tissue by suture and ligation.

I do not feel it necessary to close the gap in the fascia lata after removal of living sutures. Since I began using the stripper, I have never had to make a long incision in the thigh and have not, therefore, had an opportunity to close the gap; I have not encountered a case in which trouble has arisen because of this procedure. The worst that can happen is to have a muscle hernia, and I am satisfied that this will develop only when a large amount of fascia has been removed. Such a hernia is never the cause of symptoms, but I always make it clear to the patient what may occur, and assure him that the muscle hernia will not incapacitate him in any way, even if it bulges considerably during exercise. I further impress on him the fact that he should not let anyone operate on it.

I am satisfied that with the addition of living sutures to the armamentarium for repair of hernia, a higher percentage of cures can be obtained than was possible formerly. Furthermore, many hernias which were formerly considered inoperable can now be safely and satisfactorily repaired by using procaine as a spinal anesthetic agent and by using living sutures, either alone or in addition to some absorbable suture material that will last about twenty days.

Bibliography

1. Gallie, W. E., and LeMesurier, A. B.: Living sutures in treatment of hernia. Can. Med. Assn. Jour., 13:469-480, (July) 1923.
2. Gallie, W. E., and LeMesurier, A. B.: The use of free transplants of fascia as living sutures in the treatment of hernia. Arch. Surg., 9:516-529, (Nov.) 1924.
3. McArthur, L. L.: Autoplastic sutures in hernia and other diastases. Jour. Am. Med. Assn., 43: 1039-1048, (Oct. 8) 1904.
4. Masson, J. C.: A new instrument for securing fascia lata for repair of hernia. Proc. Staff Meetings of Mayo Clinic, 8:529-530, (Aug. 30) 1933

CLINICAL STUDIES IN JUVENILE RHEUMATISM*

M. J. SHAPIRO, B.S., M.D., and GERTRUDE K. SHAPIRO, B.A.

Minneapolis

THIS study was undertaken for two main reasons, first, to observe the development of rheumatic disease in children in this part of the United States to determine whether or not it differs from the same disease in other parts of this country and abroad and, second, to determine the expectancy of recurrences in non-specifically treated rheumatic disease in children, this information to be used as control data in estimating the efficacy of specific types of therapy.

During the past twelve years I have had the opportunity of observing the development of rheumatic disease in several hundred children. These patients were first seen either during their first attack of rheumatic fever or chorea or more often immediately after their first attack when they were supposedly well and had returned to school. This work was carried on at the Minneapolis Public School Heart Clinic at Lymanhurst and also at Dowling School, where a number of cardiac children receive special care and education. The group of patients at Dowling School has been examined each week for the past eight years. Careful temperature and weight curves and continuous clinical notes have been kept on all these patients during this time. The rest of the cases have been observed in the outpatient cardiac clinic and many of these children have been studied for a period of ten years or more.

Juvenile Rheumatism and Chronic Arthritis

The term juvenile rheumatism is used to designate the type of rheumatic infection which most commonly occurs in early childhood and which causes 90 per cent of all heart disease in children and young adults and is responsible for about 40 per cent of all deaths due to cardiac disease. Juvenile rheumatism includes rheumatic fever, chorea and the very important and often unrecognized subacute form of rheumatic infection in children erroneously termed "growing-pains." Without entering into the controversy as to whether or not rheumatic fever and chronic arthritis are manifestations of the same disease appearing at different age periods, as far as I have been able to determine juvenile rheumatism has little if anything in common with chronic arthritis. In the hundreds of cases of rheumatic infection which I have followed for the past twelve years I have never seen one instance where the patient developed chronic arthritis directly following juvenile rheumatism. I have seen four patients in whom several joints remained swollen and tender for a period of months following an acute attack of rheumatic fever but in every instance the joints did finally clear up entirely with no x-ray or other evidence of permanent joint damage. Chronic arthritis rarely if ever produces valvular heart disease and heart disease as a complication of the chronic arthritides need hardly be considered. On the other hand, in juvenile rheumatism involving the joints, little concern need be given to permanent joint damage but the most important phase of the rheumatic problem in childhood is the great danger of permanent cardiac damage.

Age of Onset

Juvenile rheumatism, whatever its first manifestation, has its inception in early childhood; the peak of incidence in Minneapolis is between five and six years of age as shown by Figure 1. This is somewhat younger than the figure given in other parts of this country and abroad. A study of our case records shows an equal rate of occurrence as to sex. In various other clinics, females predominate over males and it is commonly taught that girls have considerably more rheumatic infection than boys. I believe that our figures are probably more nearly correct as we have been able to obtain a more average cross-section of these patients than is obtainable by a clinic not connected with the school system. It has been stated by some of the English observers that rheumatic fever rarely occurs before the third year of age. This has not been found true in our clinic. We have seen several children who acquired their first attack of juvenile rheumatism in the first two years of life.

---

*From the Lymanhurst School Cardiac Clinic. Read before the annual meeting of the Minnesota State Medical Association, Duluth, July 17, 1934.

Seasonal Incidence

In determining the seasonal incidence of juvenile rheumatism in Minneapolis, all attacks of rheumatic fever and chorea in a series of cases were studied. As Figure 2 shows, the frequency curve rises abruptly in February, reaches a peak during the months of March and April, drops abruptly during the Summer months and rises again during the Fall months of October, November and December. As has been shown in other parts of the country, rheumatic disease in childhood is most common during the early Spring and late Fall. An explanation for this seasonal variation has not as yet been definitely determined. It has been suggested that this variation is related to the seasonal rise in frequency of upper respiratory infections. It is possible, too, that this seasonal variation may be due to dietary deficiencies which are more prone to occur at the end of a long winter.

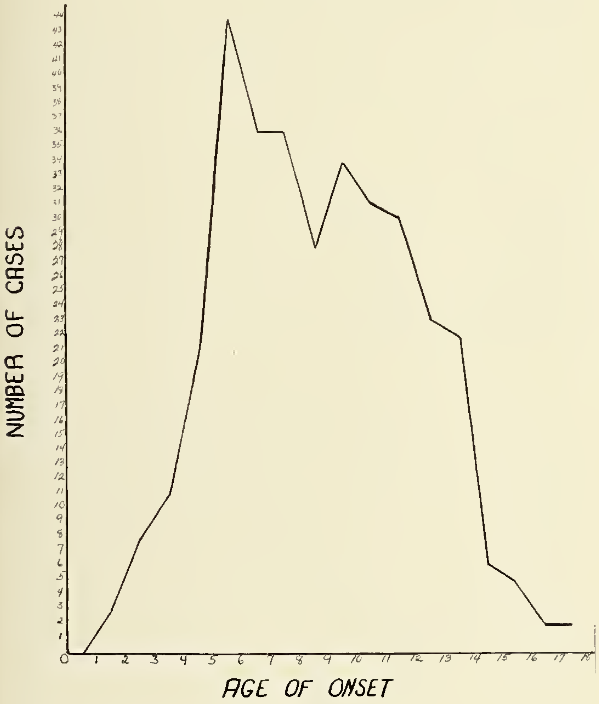


Fig. 1.

Family Incidence

It has been shown that rheumatic infection is probably more familial than tuberculosis. There is considerable evidence that juvenile rheumatism is a low-grade contagious disease and a number of so-called epidemics have been reported in hospital wards and in some of the boarding schools in England. A study of our records corroborates this finding. It is rather startling to observe how often a history of rheumatic disease in early childhood is given by the parents of our patients.

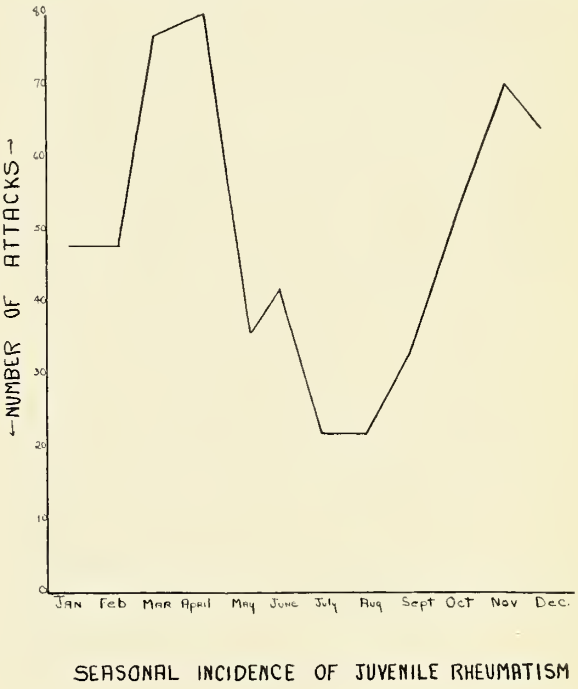


Fig. 2.

It is not uncommon to find two or even three children in the same family suffering from rheumatic fever at the same time. I have one family under my care at the present time in which five brothers and sisters have had either rheumatic fever or chorea or both. One of these children has already died of valvular heart disease, two have badly crippled hearts and two have definite evidence of early mitral valve involvement. The mother of this family gives a history of rheumatic fever in childhood, but as far as I know has no cardiac involvement. In order to point out our experience in the matter of family tendency I have gone over all the cases observed during the past school year, 1933-34. During these ten months 370 patients have been examined at the Clinic and at the Dowling School. As Table I reveals, 201 of these children gave a history of juvenile rheumatism and 120 of them had already definite rheumatic heart disease. Sixty-seven had congenital heart disease, forty-four presented murmurs of a non-pathologic nature, five had neuro-circulatory-asthenia, six had extra-systolic arrhythmia and forty-seven were found to have no cardiac disease. In comparing the family histories of the children who had suffered from rheumatism with the families of all the other children examined as controls, it was found that in 46.7 per cent of the families of rheumatic children other members gave a history of rheumatic infection in childhood while in the control group only 14.7 per cent gave such a history, indicating that the family tendency is three times as great in the rheumatic group as in the control group. These bare figures do not, however, tell the whole story. All these histories have been taken by me and it was found that in the rheumatic group two, three or even more members of a family gave a positive rheumatic history while in the control group it was rare to obtain a history of more than one other member of a family with a positive history. An explanation for this familial tendency in childhood rheumatism is not at present clear. It has been suggested that housing has something to do wih it; the English especially feel that damp and unsanitary homes may have an important bearing in this matter. Others have felt that diet may be the important factor; still others believe in the contagiousness of the disease.

TABLE I. FAMILY TENDENCY IN JUVENILE RHEUMATISM COMPARED WITH FAMILY TENDENCY IN NON-RHEUMATIC CHILDREN

Diagnosis	Cases	Total number of cases	Family incidence	Percentage
Rheumatic heart disease	120			
Potential heart disease	81	201	94	46.7
Congenital heart disease	67			
Non-pathological murmur	44			
Neuro-circulatory asthenia	5			
Extra-systolic arrythmia	6			
No heart disease	47	169	25	14.7
Total number of cases examined 1933-1934	370			

Errors In Diagnosis

It may be of some value to point out the nature of some of the errors in diagnosis encountered at the Clinic. It will be noted in Table I that of 370 patients examined during the past year 102 were found to have no organic heart disease. Many of these children had been examined by their own physicians and in too many instances a diagnosis of serious heart disease had been made. In some cases children had been put to bed for weeks and months because a systolic murmur was heard at the apex or an extrasystole was present and in other instances no reason could be made out for the error in diagnosis. I should like to point out the seriousness of making a mistaken diagnosis of heart disease in an impressionable child by citing two cases which came under my observation recently. The first case is that of a sixteen year old girl who was told she had heart disease more than two years ago. She had been kept in bed for almost a year and since being out of bed has such a fear of "dropping dead" that she refuses to be alone, is unable to attend school and has become a total invalid. Her family had moved into Minneapolis in order to have her admitted to the special school for cardiac children. On examination, no cardiac disease could be made out. There was a blowing systolic murmur at the apex which proved to be functional in nature. Repeated attempts were made to urge this girl to enter school, she was assured that her physical condition was good but all our efforts failed and she is at present practically incapacitated due entirely to an incorrect diagnosis. The second case is that of a young man thirty years of age whom I examined recently. At sixteen years of age this patient was told he had "leakage of the heart" and that he must not take gymnasium work, must not do any kind of strenuous exercise, etc. The boy was profoundly disturbed by this information. He began to give up his friends, he kept to himself and became quite inactive. He stated that he was in constant fear of sudden death and had planned his life with the expectation that he did not have long to live. When he finally entered the University, in spite of reassurance that his heart was normal, he refused to enter any type of athletics and took courses which would not be a strain on his supposed diseased heart. Since graduating from the University he has not married because of the persistent fear of early death. Although he had been informed by several physicians that his heart was quite all right he reported fourteen years after the original mistaken diagnosis, still complaining of heart trouble. Once a diagnosis of heart disease is made it seems almost impossible to convince the patient that his heart is, in fact, not diseased. These examples are only two of many which are constantly observed. It is not uncommon to find that some doctor had prescribed tincture of digitalis when the patient had no cardiac disease. Many children with normal hearts ask to be excused from gymnasium because of heart disease and present letters from their doctors to the effect that they have serious cardiac disease.

The diagnosis of heart disease in children is relatively simple. There are really only two types of lesions which need be considered, rheumatic valvular disease, which accounts for 90 per cent of heart disease in children and young adults and congenital lesions. Concerning the diagnosis of rheumatic heart disease I should like to point out the importance of a good history. Given a child suspected of having valvular heart disease, one can guess that he has no organic cardiac disease if no history of juvenile rheumatism is obtained and the guess will be correct nine times out of ten. Even if rheumatic heart disease is present, it is not necessary to give the patient digitalis or restrict his activities in any way unless there is evidence of decompensation. Children with rheumatic cardiac disease get into difficulty not because of overactivity but rather because of infection. A sore throat, an upper respiratory infection or any other type of infectious process reactivates a smouldering rheumatic disease and more and more heart involvement results. The diagnosis of heart disease is a serious matter and great caution should be exercised before such a diagnosis is made.

Nature of Onset

Several investigators have pointed out the important fact that a large percentage of children who develop rheumatic fever give a history of an upper respiratory infection a week or ten days before the onset of the rheumatic process. The usual story is that a child develops a sore throat or cold and may be absent from school a few days, then returns to school apparently well when a sudden involvement of the joints occurs and the child is thrown into an acute attack of rheumatic fever. This quiescent period between the onset of the upper respiratory infection and the onset of rheumatic fever is considered as the period of developing allergy. When the child becomes sufficiently sensitized to the infection in his throat or bronchi he breaks out rather suddenly and acutely with rheumatic fever. Our experience leads me to concur in this general idea. However, I have noted that any infectious process may act as the sensitizing agent, not alone the upper respiratory infection, and a good many children develop rheumatism gradually with no prodromal infection. During this past year careful histories have been obtained from the parents of our patients in regard to the exact nature of the onset of the attack of rheumatism. These patients are for the most part young children who had recently recovered from an attack of rheumatism and in whom it was possible to obtain a correct detailed history.

TABLE II. TYPES OF ONSET OF JUVENILE RHEUMATISM

Onset preceded by:	Number	Percentage
Cold	27	13.5
Sore throat	9	4.5
Pneumonia	4	2.0
Measles	2	1.0
Scarlet Fever	12	5.9
Chorea	20	9.9
Other	9	4.5
Gradual Onset	90	44.8
Not obtained	28	13.9
Total	201	100

As Table II shows, of the 201 children with rheumatic disease, twenty-seven, or 13.5 per cent, had a cold a few days before the onset of rheumatic fever, nine, or 4.5 per cent had a sore throat and four, or 2.0 per cent, suffered an attack of rheumatism during convalescence from pneumonia and two, or 1.0 per cent, following measles. Twelve children, or 5.9 per cent, developed rheumatism during scarlet-fever. Nine children, or 4.5 per cent, had various types of onset. One child developed rheumatic fever a few days after an accident, two had an abscessed ear shortly before the onset, two had infected fingers a week or ten days before the rheumatism began. Twenty children, or 9.9 per cent, started their rheumatic disease with chorea. In ninety, or 44.8 per cent of the patients, the onset was gradual with no history of any preceding sensitizing infection. These patients gave a history of joint pains for several months until the joints, in many instances, gradually became swollen and hot and the child finally was forced to go to bed. In twenty-eight, or 13.9 per cent, of the patients the history was not obtained. A study of the histories of onset of rheumatic infection in these children shows that a fair number of them develop their rheumatism following an upper respiratory infection but that any type of infection or shock may act as the sensitizing factor in a susceptible child and that a gradual onset with no preceding infection is the most common type.

The knowledge of the prodromal infection in rheumatic fever is important from a therapeutic standpoint. In observing our patients at Dowling School we have learned to keep them in bed from ten days to two weeks after each cold or sore throat or any other infectious process. Such conservative treatment, I believe, has prevented new attacks of rheumatic fever in many instances.

Signs of Activity

Rheumatic infection in children is a long continued low grade infection which can be compared to tuberculosis or syphilis. A single attack seems only to sensitize children to frequent recurrences. These rheumatic children often return to school showing much evidence of persisting infection. Not uncommonly, I have seen them in school with one or more joints swollen and tender. They often run a fever up to 100° and over for months and years. They do not recover between the acute flare-ups of rheumatic disease but in most cases continue to carry this smoldering infection which gradually produces more and more crippling of the heart. This process continues even while the children are attending school and are apparently well. However, if one is on the lookout for certain clinical signs children with this persistent infection can be diagnosed. They are usually underweight, they have a pallor, they look feverish, they commonly complain of unexplained abdominal pain, vomit easily and often have severe idiopathic nosebleeds. We have learned that frequent nosebleeds in rheumatic children is always a sign of continued activity. These attacks of epistaxis are prone to be so severe that they are difficult to stop. In the past year it has been necessary to hospitalize two of my rheumatic patients because of alarming nosebleeds. It has long been known that nosebleeds are common in acute rheumatic fever but only in the last few years have we learned that they occur frequently in ambulatory rheumatic children.

Non-rheumatic "Growing-pains" and Joint-pains of Sub-acute Rheumatic Fever

Early in my experience at the Clinic all children complaining of leg pains were considered as rheumatic patients. By following a large number of them over a period of years I have learned that by far the greater number of such children are not suffering from rheumatic infection. It has been possible to make a clinical differentiation between the much larger group of children with "growing-pains" only and that group who have actual joint disturbances which, while it does not make it necessary for them to go to bed are, nevertheless, suffering from subacute rheumatic fever. This differentiation was made possible by contrasting careful histories obtained from the children with "growing-pains" and from their parents with the histories obtained from children who had already had a first attack of rheumatic fever or chorea and were now complaining of joint pains. Children with "growing-pains" complain of pain in the muscles of the thighs and legs, they never limp because of this pain, they have no fever, their pain most commonly comes on a few hours after they have gone to bed. This pain may be very severe and cause the child to cry out at night and make it necessary for the parent to massage the painful extremity or apply heat. On awakening in the morning they are entirely free from pain and have no stiffness or difficulty in walking. On the other hand children with pain in the extremities due to rheumatic infection have pain in the joints. On inquiry, a child with growing-pains will be very vague as to the location of his pain, he will usually run his hand over the entire thigh or leg when asked to point out the exact site of his pain while a child with rheumatic infection will invariably point directly to his knee, ankle, or hip joint. Children with joint pains due to rheumatism are often found to have a fever of low-grade, they commonly limp because of the pain, they complain mostly on attempting to walk or move, the joints on careful examination may be found to be slightly swollen, the painful joint

TABLE III. DIFFERENCES BETWEEN NON-RHEUMATIC "GROWING-PAINS" AND JOINT PAINS OF SUB-ACUTE RHEUMATIC FEVER

	Non-rheumatic "growing-pains"	Joint pains of sub-acute rheumatic fever
Time of pain	Soon after going to bed. Pain gone in morning. No pain on motion.	Worse on arising. Exaggerated on motion. Difficulty in walking, may cause limp. Pain present during most of day, disappears on getting warm in bed.
Location of pain	In muscles of thighs and legs. Child vague in pointing out site of pain.	In joints themselves. Child points directly to knees or ankles. Often complains of pain in joints of upper extremities also.
General health	Usually good	Usually poor
Other signs of rheumatic activity	Usually none	Common, may have frequent nose-bleeds, unexplained fever, pallor, abdominal cramps, undernourishment. Evidence of carditis.
Objective findings in joints	None	Often joints are slightly swollen and hot.
Family history of juvenile rheumatism	Uncommon	Very common

may be somewhat warmer than the non-affected one. They are relieved of pain on getting warm in bed and rarely complain during the night. On arising in the morning they complain of stiffness in the joints and are unable to walk comfortably for an hour or two. By careful inquiry and examination it is possible to differentiate clinically between the much larger group of children with pains in the extremities of undetermined non-rheumatic origin from the smaller group who have actual subacute rheumatic fever and are in constant danger of developing cardiac involvement (Table III).

TABLE IV. INCIDENCE OF RECURRENCES IN JUVENILE RHEUMATISM

Total number of rheumatic children examined.....342
Children with one attack only..................178
(52.1 per cent)
Children with recurrent attacks.................164
(47.9 per cent)

Recurrences within	Number	Per cent	Total	Per cent
1 year........	44	26.8	44	26.8
2 years.......	44	26.8	88	53.6
3 years.......	28	17.1	116	70.7
4 years.......	20	12.2	136	82.9
5 years.......	5	3.1	141	86.0
6 years.......	8	4.9	149	90.0
7 years.......	4	2.4	153	93.3
8 years.......	5	3.1	158	96.4
9 years or more	6	3.6	164	100.0

Expectancy of Recurrences

In order to determine whether or not any specific treatment is effective in such a long continued infectious process as juvenile rheumatism it is necessary to know first what may be expected in a group of untreated cases followed over a number of years. For this reason the normal expectancy of recurrences in childhood rheumatism has been studied. It will be noted in Table IV that of 342 cases studied over a varying number of years 178, or 52.1 per cent, of the patients had only the one attack so that more than one-half of them gave no history of recurrences. It is true that some of this group will eventually recur if followed over a longer period of time. Table IV does, however, show that of the 164 children who did give a history of recurrences forty-four, or 26.8 per cent, recurred during the first year after the primary attack, forty-four, or 26.8 per cent, recurred during the second year, so that eighty-eight, or 53.6 per cent, had had secondary attacks at the end of the second year. Twenty-eight, or 17.1 per cent, recurred during the third year so that 116, or 70.7 per cent, had relapsed at the end of three years. At the end of four years 136, or 82.9 per cent, had suffered recurrences, twenty, or 12.2 per cent, of the children having had secondary attacks during the fourth year after the initial infection. Recurrences continued as the children were observed from year to year so that at the end of nine years practically 100 per cent of the 164 patients had one or more relapses. I should like to point out as a result of this study that it is necessary to follow a group of rheumatic children from four to five years after the onset of any specific treatment before definite conclusions as to the value of such treatment can be drawn.

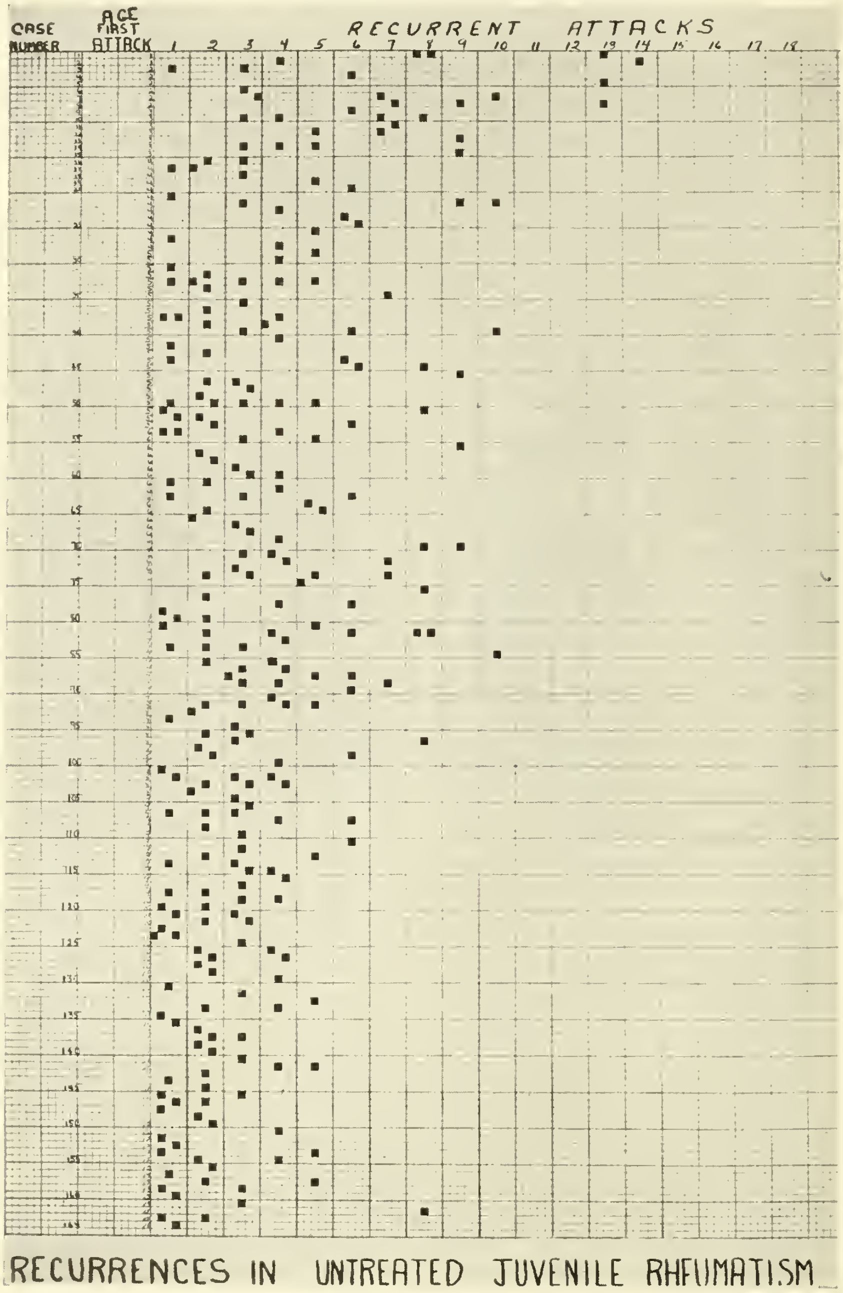


Fig. 3.

To point out more clearly the long continued nature of childhood rheumatism and the number of years that must elapse before one can say that the disease has become quiescent or cured, I have made a spot-map, Figure 3, depicting each attack in the 164 patients who gave a history of recurrences. It will be noted, for instance, that the first child had her first attack at one year of age, was free from manifest rheumatism for eight years when she had two attacks during one year. She was then free from rheumatism until her thirteenth year, when she had her fourth attack. The second case, a boy, also had his first attack during the first year of life, was free from symptoms for the next three years, had a second attack in his fourth year, was apparently well for the next ten years only to have a recurrence again during his fourteenth year. In Case 7 the first attack occurred in the second year, with recurrences three, seven, and ten years later. The first episode in Case 33 occurred at five years of age and then recurred each year for the next five years. It is interesting to note that children may be free of rheumatism for many years after the first attack only to have a secondary attack years later as, for instance, in Case 56 where the initial rheumatic infection came at six years of age and there was no further rheumatic disease until ten years had elapsed.

A study of these data indicates that with no specific treatment a good number of rheumatic children have but a single attack and never have any further trouble but that the majority have repeated attacks over many years, and that freedom from rheumatism even ten years after an initial attack is not absolute proof that the disease is arrested.

Summary and Conclusions

1. The peak of incidence of rheumatic disease in children in Minneapolis is between five and six years of age. This is somewhat younger than the incidence presented by various clinics in this country and abroad.
2. The seasonal incidence in this part of the United States is similar to the seasonal variation in other parts of the world.
3. The family incidence among families of rheumatic children is 46.7 per cent; three times as great as among families of a control group of non-rheumatic children.
4. A considerable number of children develop rheumatic disease soon after an acute upper respiratory infection but the great majority of them develop the disease gradually with no preceding infection.
5. Children with subacute rheumatic disease who are apparently well and attending school present symptoms which are characteristic of the disease. Recognition of these symptoms makes an early diagnosis possible.
6. The great majority of children who complain of leg-pains are not suffering from rheumatism. A clinical differentiation is presented which makes a correct diagnosis possible.
7. The normal expectancy of recurrences in a group of rheumatic children treated non-specifically is presented. These data are to be used as a control in determining the efficacy of any specific treatment.
8. A spot-map indicating al lthe recurrent attacks of rheumatic disease among 164 patients followed over a number of years is presented. This chart demonstrates the marked chronicity of juvenile rheumatism.

MUMPS MENINGO-ENCEPHALITIS*

T. L. BIRNBERG, M.D.

Associate Professor of Diseases of Children, University of Minnesota

Saint Paul

IN the past eighteen months, we have observed nine cases of mumps meningo-encephalitis, an unusually striking incidence when contrasted to the occasional isolated case observed in the prior two decades. This relatively high incidence suggested the possibility that many cases may be unrecognized; further, the increase also of cases of epidemic encephalitis, during this period, suggests some possible causal relationship.

Mumps is the earliest historically recognized contagious disease. Hippocrates (460-370 B. C.) recorded his accurate observations of an epidemic that occurred in Thasos. He further described the orchitis that sometimes occurs. Subsequent observers recorded their experience with mumps, and throughout, even as today, this illness has been considered a benign and innocuous ailment, and almost no serious thought has been given to the relative frequency or severity of its so-called complications. True, in the preadolescent age, complications are infrequent, whereas in the post pubertal period, even since antiquity, medical writers have been cognizant of the frequency of orchitis, oöphoritis, mastitis and pancreatitis, and, save for pancreatitis, have considered these complications to be harmless or at most, temporary uncomfortable disturbances. Other complications are occasionally mentioned, as, otitis, labyrinthitis, bronchitis, pneumonia, dacryocystitis, arthritis, laryngitis, nephritis, et cetera, but generally these are the usual secondary, non-specific conditions that may accompany any infectious disease.

---

*Read before the Northwestern Pediatric Society at the annual meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

The group with which we are particularly interested here are the presumably rare neurological complications as meningitis, encephalitis, meningo-encephalitis, neuritis, et cetera. A review of the literature impresses one that these complications occur only in some of the epidemics of parotitis, and in these in varying degrees of severity, whereas other epidemics are entirely benign in all their manifestations. The first record of mumps meningitis was made by Hamilton,[6] who reported to the Edinburgh Medical Society, in 1758, a case of fatal meningitis complicating mumps in a man of twenty-two years. French, in 1812, and Malshioche, in 1867, described this condition. Gailhard, in 1877, reported six cases. Gunderson[4] refers to presumptive cases of mumps meningo-encephalitis described in Norway by Skjelderup and Conradi, in 1864, Ibbestad, in 1875, and by Kolbjörsen, in 1890. No complete summary of the literature has been made since those by Acker,[1] in 1913, who collected 150 cases and that by Casparis,[2] in 1919, but, in all perhaps no more than 250 cases have been reported. However, since undoubtedly many cases have failed recognition and others have not been reported, this number gives no true index of these neurological complications.

In an endeavor to evaluate the comparative incidence of neurological disturbances to the total number of cases in a given mumps epidemic area, we find the literature misleading. Thus, de Massary, E. Tockman, and Lues[9] report six cases of mumps meningo-encephalitis in 653 hospitalized mumps patients; Haden[5]—nine cases in 840 mumps patients; and Wesselhoeft[13]—two cases in 824 patients admitted to the Haynes Memorial Hospital. However, all these men have no index of the total number of cases of parotitis of which these neurological disturbances are a manifestation, since so many cases of mumps are never seen or reported. Thus, their conclusions of incidence are obviously inaccurate. Larkin,[7] in 1919, reported two cases in 2,400 cases of mumps at a training camp, which gives a more accurate index of neurological complications in adults during this particular epidemic. Undoubtedly the most valuable statistics might be compiled from incidence records in orphanages over a long period of years, but we were unable to find any such reports in the literature.

The types of neurological complications are manifold but are commonly designated as meningitis, encephalitis, meningo-encephalitis, neuritis, and myelitis. The cases we are reporting seem best described as meningo-encephalitis. Although meningeal or encephalitic symptoms may variably predominate, in general it would appear to be clinically neither advantageous, nor at times possible to differentiate the essential localization. Suffice it to suggest that in our cases and in the large majority of reported cases, the symptoms and findings indicate a mild to severe meningo-encephalitic involvement.

The etiology, because of the association with mumps, would appear to be due to the mumps virus or to a toxin liberated by the virus. However, indubitable experimental evidence has not yet been produced. True, Wollstein[14] made intrathecal injections in cats of the pooled, filtered, mouth washings of mumps patients, producing symptoms of meningitis, and Gordon,[3] in 1913, produced encephalitis in monkeys by intraspinal injections of mumps mouth washing filtrates, but these experiments do not prove the presence of the virus in the spinal fluid in cases of human mumps meningo-encephalitis. McKaig and Woltman[8] report a case of transverse myelitis complicating mumps from which cultures taken from Steno's duct and from the naso-pharynx were injected by Rosenow into rabbits with resultant paralysis in eight hours in one case. This experiment would suggest a neurotropic type of mumps virus in the spinal fluid. However clinical experience would seem to justify the opinion that the meningo-encephalitis is due to the mumps virus per se, the occurrence of neurological symptoms before the glandular localization of the virus in some cases would tend to strongly negate the virus toxin theory.

The pathological status of mumps meningo-encephalitis is not clearly or thoroughly defined since necropsy reports are rare. Larkin[7] reports one case with congestion of the pia arachnoid, and patchy infiltration along the cerebral blood vessels. Microscopically the meninges showed a lymphocytic infiltration. Four cases reported by Gordon,[3] which we believe are cases of mumps meningo-encephalitis without clinical parotitis, showed congestion of the meninges, flattening of the sulci from pressure, and lymphocytic infiltration of the pia arachnoid. In none of the reported cases were cord hemorrhages, as seen in poliomyelitis, observed.

The symptomatology of mumps meningitis is not clear cut, although our cases maintain a rather distinct similarity, probably because they all occurred in about the same epidemic period. Males are attacked more than females—in our series a ratio of 67 to 33 per cent. No age group susceptible to mumps seems immune.

The occurrence of the meningo-encephalitis in relation to the onset of the parotitis is variable. Undoubtedly the majority occur after the onset of the parotitis—in our series in from one to ten days. In others the meningo-encephalitis may occur concomitantly with the appearance of the mumps as did one of our cases. Lastly the neurological manifestations may precede the parotitis by several days as occurred in cases reported by Casparis,[2] Walker,[11] Weissenbach,[12] and Taillens.[10] Finally there is a group of cases in which the meningo-encephalitis would appear to be of undoubted mumps origin by virtue of epidemiological contact, but in which the parotitis never occurs, just as mumps orchitis without parotitis is occasionally observed. Thus, Case 7 in our series, had so slight a parotid thickening that in the absence of other cases of mumps in the family, it might have been overlooked. The four cases reported by Gordon[3] seem also to fall into this group.

The onset of meningitis is rather sudden; the initial symptom is almost invariably a severe headache, partial or generalized. Occasionally convulsions presage the onset. Shortly projectile vomiting occurs. The temperature varies from 100° to as high as 105°. Approximately half the patients are drowsy, the rest showing variable degrees of irritability to delirium, at times associated with spells of drowsiness. Hiccoughs, paresthesias, diplopea, and other signs of local irritation may occur.

The examination will almost invariably reveal neck rigidity and a positive Kernig. The reflexes are more often a little hyperactive rather than decreased. Tache cerebrale is occasionally present. Localizing signs or isolated reflex changes are rather infrequent.

On spinal puncture there is an increased fluid pressure. The fluid is much like that of the other encephalitides or of tuberculous meningitis. The cell count may vary from 20 to 2,000, although it is usually 100 to 300 cells per cubic millimeter. The cells are predominantly lymphocytes; globulin is absent or, if present, only in traces. Smears and cultures are negative. There is often a slight increase of sugar and of chloride content of the fluid.

The course persists from five to fourteen days and is usually followed by complete recovery. In our series, all recovered, with no sequelæ being discovered as yet, the observation period now being from three to eighteen months. In some epidemics, cases of increased severity, with more or less permanent hemiphegia, monoplegia, deafness or ocular paresis may occur, but these are in the minority.

In the treatment, spinal puncture and drainage combined with the ordinary symptomatic procedures seem to be all that is necessary.

The problem of diagnosis rests essentially in the appreciation that neurological complications are not rare. With this premise, diagnosis becomes relatively simple. True, there are no characteristic or pathognomonic signs to differentiate from early tuberculous meningitis, other types of encephalitis and even poliomyelitis, the identification depending on the associated mumps or in its absence, by the presence of a mumps epidemic or contact. As succinctly stated by Wesselhoeft[13] "The circumstantial evidence is probably the outstanding aid in diagnosis."

In our experience, an outstanding point of diagnostic value is the presence of relatively mild neurological symptoms in conjunction with a high cell count and negative Nonne in the spinal fluid.

Tuberculous meningitis usually develops more slowly, early has a cerebral cry, and the clinical symptoms when developed are more severe. The spinal fluid shows a pedicle formation, which we have never abserved in mumps meningitis. Further, the Nonne is usually positive, the sugar decreased, and if the organism can be found, the diagnosis becomes obvious.

Poliomyelitis shows many similarities, but an early paralysis or absent reflexes commonly develops. The spinal fluid cell count is much as that in mumps meningo-encephalitis but early is made up largely of neutrophils. The Nonne is commonly positive in poliomyelitis.

Septic or epidemic menigitis results in a much more marked neck rigidity, frequently with severe opisthotonos. The early purulent spinal fluid with demonstrable organisms readily differentiates the two conditions.

Obviously other types of encephalitis can only be accurately differentiated by a recognition of the etiological illness.

Discussion

Our primary purpose in reporting these nine cases was to suggest the relative frequency of neurological complications in mumps. The increasing prevalence of encephalitis of all types in the past fifteen or twenty years suggests a number of problems of interest. Is this increase a phase in the life cycle of a disease present for centuries with waves of epidemics at relatively long intervals? An analogy is found in the life cycle of our more common infectious diseases, with epidemic waves every five to twenty years. The encephalitis epidemics differ in being much more infrequent.

Twenty years ago we began to observe increasing cases of epidemic encephalitis. Outbreaks occurred at intervals and in scattered parts of the world. From a review of reports it is observed that the course, symptomatology, prognosis, and the occurrence of sequelæ or the production of a chronic stage, varied with each particular epidemic area and period. This would indicate that encephalitis may be due to a number of different organisms, alike chiefly in their predilection for the nervous system.

During this same two decades, we have also observed an increase of encephalitis following measles, vaccination, mumps, and other infectious diseases. The etiology remains unanswered, but several probabilities are suggested. First, are these cases due to a neurotropic change in the life cycle of the virus of measles, vaccinia, mumps, et cetera, as was first suggested by Gunderson,[4] in 1927? Second (and more probable) does the initial infectious disease, by lowered resistance perhaps, either activate or prepare a portal of entry for a quiescent encephalitis virus of which many of us are at present carriers? A similar condition, for instance, is observed with the meningococcus, the diphtheria bacillus and the pneumococcus. Lastly, is the encephalitis in all cases caused by a symbiotic reaction of a common encephalitis virus of measles, mumps, vaccinia, and, in the case of epidemic encephalitis, with some as yet unidentified "grippal" or "flu" virus?

We do no more than suggest these possibilities, feeling that ultimately some causal relationship between the various encephalitides may be established.

Summary

1. A report of nine cases of mumps meningo-encephalitis is made. The clinical, physical, and spinal fluid findings are briefly discussed.
2. It is felt that the incidence of mumps meningo-encephalitis is increasing and it is our prime purpose to call attention to this complication to aid in its more frequent recognition.
3. The problem of diagnosis rests essentially on the knowledge that neurological complications do occur, and on the recognition of the related mumps, the circumstantial evidence of mumps contact or a prevalent mumps epidemic. To us the relatively mild symptoms in comparison with the high spinal fluid cell count is a valuable differential criterion.
4. In treatment, spinal drainage and symptomatic procedures are all that are indicated.

Report of Cases

Case 1.—J. B., a boy of six years, developed mumps on February 27, 1933. Two days later he complained severely of frontal headache, and vomited frequently. His temperature rose to 102° (rectal).

When seen on the following day his temperature was 102° (r.), and he was quite drowsy. Both parotids were enlarged and tender. Neck rigidity and a positive Kernig were present. The reflexes generally were hyperactive.

Spinal puncture revealed a clear fluid under increased pressure. The cell count was 80, of which 74 per cent were lymphocytes. Nonne negative. On the following day his temperature was normal and the symptoms were less intense. Within three days neck rigidity and Kernig disappeared. Recovery was complete with no sequelæ. This represents a milder type case with rapid response to spinal drainage.

Case 2.—J. K., a boy of seven years, developed a mild parotitis on March 22, 1933, which cleared up after four days. Two days later he developed headache, malaise, and fever of 101°. Severe headache and vomiting persisted for two days, with a fever of 100-102°. Examination at this time showed marked neck rigidity and a positive Kernig. The child was irritable but mentally clear. Tache cerebrale was strongly positive.

On spinal puncture, clear fluid spurted from the needle. Twenty-five c.c. of fluid were removed. The cell count was 980, 93 per cent being lymphocytes. Mild fever, moderate neck rigidity, and spinal fluid cell count of 150 to 400 on daily puncture persisted for five days. Recovery was then complete with no sequelæ.

Case 3.—P. E., a boy of thirteen years, developed a right parotitis on May 9, 1933. Six days later he developed a severe frontal headache, nausea, vomiting, and a fever of 101°. These symptoms persisted for five days before the child was seen for the first time. At this time his temperature was 99°, Kernig positive, neck rigid and there was a strongly positive Tache. Spinal puncture revealed only slightly increased pressure. The fluid was clear, the cell count was 22 with 94 per cent lymphocytes. Nonne and smears were negative.

The headache and vomiting persisted and three days later spinal puncture showed little change from the prior examination. Two days following this puncture, his examination was negative. Recovery was complete with no sequelæ.

Case 4.—D. G., a boy of fourteen years, developed a bilateral parotitis on July 3, 1933. Ten days after the onset and two days after the parotid swelling had entirely subsided, he complained of frontal headache and vomited several times. The following day his temperature rose to 101°.

Examination at this time revealed moderate neck rigidity and a slightly positive Kernig. Abdominal reflexes were absent. A faint Tache was noted.

Spinal puncture revealed a clear fluid under slight increase of pressure. The cell count was 182, of which 88 per cent were lymphocytes. The globulin tests were negative. The symptoms subsided thirty-six hours after the spinal drainage and recovery was complete without any sequelæ.

Case 5.—D. E., a boy seven years of age, developed a right sided parotitis December 12, 1933, with a fever of 100 to 101°. On the third day the parotid swelling began to recede and the child felt quite well.

On the next morning the patient vomited three times. Following this he complained of constant severe generalized headache and also of abdominal pain. His temperature rose to 102°. The next morning the headache was still present and the child again vomited. When examined there was found to a slight neck rigidity and slight Kernig. Only a trace of parotid swelling was present. His temperature was 102°.

Spinal puncture was performed, 14 c.c. being removed under considerable pressure. The cell count was 142, of which 89 per cent were lymphocytes. The Nonne was negative.

Following the puncture the temperature dropped to 100°, the child being much brighter and much more comfortable. On the following day the headache and vomiting had entirely subsided, although the temperature persisted between 99 and 100° and a slight neck rigidity was still present. The day following this the temperature was normal and all symptoms had subsided. No sequelæ were observed.

Case 6.—R. M., a girl of twelve years, first developed a bilateral parotitis on February 11, 1934. Four days later the swelling began to recede. On March 17, 1934, or six days after the onset of the mumps, the child began to have severe hiccoughing. She later complained of headache which became intense on the following day and was associated with vomiting and a fever of 100°. The following day the fever was up to 102° and headache and vomiting were still present.

Examination at this time revealed a moderate neck rigidity and a positive Kernig reaction. Reflexes were otherwise negative. Spinal puncture showed a pressure of 12 m.m. Hg. The fluid was clear, with a cell count of 460, 98 per cent lymphocytes. Nonne, pedicle formation, and smears were all negative.

On the following day the symptoms were less intense and two days later the child apparently completely recovered. No sequelæ were observed.

Case 7.—W. M., aged eight, a brother of R. M., became ill on March 24, six weeks after his sister first developed parotitis. He complained of headache and was quite restless. When seen on the following day, he had a temperature of 105° (r.), marked neck rigidity and positive Kernig. The facies were of a somewhat stuperous type, but the sensorium was entirely clear. The eye reflexes and movements were normal, and the other reflexes were normal. There was just a trace of fullness over the right parotid area and no history of any prior parotid swelling. However, there were four other children in the family ill at the same time with epidemic parotitis. Although the child never showed any more than this trace of parotid swelling, the history, findings, and course were unquestionably those of mumps meningitis.

Spinal puncture was performed when the child was seen; the pressure was very markedly increased, 25 c.c. of fluid being removed. The cell count was 156 with 86 per cent lymphocytes.

The following day the temperature varied from 101 to 105°, but the child appeared a little more comfortable. The neck rigidity and Kernig were still marked.

On the next day the temperature again rose to 105° (r.). Spinal puncture showed only a slightly increased pressure with a fluid cell count of 140. At this time were was still a marked neck rigidity and a positive Kernig.

During the next five days the temperature reached a high point of 103, 103.4, 101.5 and 100° (r.), gradually subsiding. The headache ceased on the fifth day of the illness, and Kernig and neck rigidity cleared on the seventh day.

On April 1, 1934, eight days after the onset, the symptoms had entirely disappeared, and neurological findings became normal.

Case 8.—B. K., a twelve year old girl, became ill on April 30, 1934, with painful swallowing and slight swelling at the angles of the jaws. The next day she began to complain of headache and vomited. This persisted and on the following day she was first seen, with severe headache, vomiting and pain in the right upper quadrant. Neck rigidity was present, and a positive Kernig. There was a point of focal tenderness over the pancreas with slight rigidity. Temperature was 102.2°. Spinal puncture showed an increased pressure with cell count of 114 (95 per cent lymphocytes). The child was more comfortable following the puncture but the next day the fever ranged from 101 to 103°. On the day following, spinal puncture still showed increased pressure with a cell count of 96. Following this puncture the headache subsided but the neck rigidity and Kernig persisted for three more days. The temperature remained between 99 and 101° that and the following night, after which it was entirely normal. The child recovered without any residue.

Case 9.—I. F., an eight year old girl, became ill with an epidemic parotitis July 22. Five days later she developed severe headache and persistent hiccoughs. The following day headache was intense and child vomited several times. Temperature was 102.5°. Spinal puncture showed increased fluid pressure and a cell count of 124, chiefly lymphocytes. The temperature subsided after this puncture, but headache persisted, as did the neck rigidity. A second spinal puncture showed practically the same findings. Following this all findings and symptoms rapidly subsided with complete recovery and no sequelæ.

Bibliography

1. Acker, G. N.: Parotitis complicated with meningitis. Amer. Jour. Dis. of Children, 6:399-407, 1913.
2. Casparis, H. R.: Cerebral complications in mumps. Amer. Jour. Dis. of Children, 18:187-193, 1919.
3. Gordon, M. H.: On a fatal illness in children associated with acute interstitial parotitis. Lancet, 2: 275-279, 1913.
4. Gunderson, E.: Has lethargic encephalitis any relation to epidemic parotitis. Jour. Infect. Dis., 41: 257-266, 1927.
5. Haden, R. L.: The cerebral complications of mumps, with report of nine cases. Arch. of Int. Med., 23:737-744, 1919.
6. Hamilton, R.: An account of a distemper, by the common people in England vulgarly called mumps. Tr. Roy. Soc., Edinburgh; 2 pt., 2:59-72, 1790.
7. Larkin, W. R.: Mumps meningitis found at Camp Taylor Base Hospital with autopsy findings. Illinois Med. Jour., 38:133-135, 1920.
8. McKaig, C. B., and Woltman, H. W.: The neurologic complications of epidemic parotitis: report of a case of parotitic myelitis. Proc. Staff Meetings Mayo Clinic, 8:542-544, 1933.
9. de Massary, E., Tockman, and Lues: Meningite lymphocytique et syndrome nerveux dans les oreillons. Bull. et Mem. Soc. med. d l'Hôp. de Par., 3s, 41:847-853, 1917.
10. Taillens, J.: La meningite ourlienne. J. de med. de Paris, 47:536, 1928.
11. Walker, F. D.: Mumps with cerebral complications. U. S. Nav. Med. Bull., 23:42-43, 1925.
12. Weissenback, R. J., Basch, G., and Basch, M.: La meningite et la meningo-encephalitis ourliennes primitives. Ann. de med., 27:5-38, (January) 1930.
13. Wesselhoeft, C.: Mumps meningo-encephalitis. Med. Clin. No. Amer., 16:899-906, (January) 1933.
14. Wollstein, M.: A further study of experimental parotitis. Jour. Exper. Med., 28:377-385, 1918.

THE EFFECTS OF EARLY POSTOPERATIVE FEEDING*

OLOF I. SOHLBERG, M.D.

Saint Paul

THE early restoration of normal function is the aim of all our therapy. Surgery is mechanical therapy and in itself produces a certain amount of damage, but is chosen as a means to an end, the lesser of two evils. The early return of function is in itself the best means of restoring the health of any organ. Witness, for example, the early moving of the joints in cases of fracture and the resulting quicker healing and better function as contrasted with the results of former treatment by absolute immobilization.

A thorough history, a painstaking physical examination and intelligent sympathetic postoperative care are as important as the operation itself. It is taken for granted that the operation is well done. The patient is in no position to judge the history or the physical examination and certainly not the operation itself, but he can and does appreciate his postoperative care. Incidentally, the doctor is judged more by the postoperative care he gives his patients than by any other one factor in his treatment. An operation is an event of importance in any one's life. As such it is the subject of much interested discussion whenever two or more people get together who have undergone this ordeal.

Dr. Alvarez in his interesting and enlightening book, "The Mechanics of the Digestive Tract," brings out the principle of intestinal gradients. He says that normally the intestinal tract is most irritable at its stomach end. Hence, stimuli arising from the presence of contained food tend to cause movements which carry the intestinal contents away from the more irritable to the less irritable parts. This is what maintains the normal direction of peristalsis. But he has also shown that irritation of any part raises the irritability of that part and this will tend to stop or reverse peristalsis. Waves away from the point of greatest irritability occur.

---

*Read before the Ramsey County Medical Society, St. Paul, April 30, 1934.

Postoperatively the most distressing symptoms are, from the patient's point of view, nausea, gas-pains and soreness of the incision. If these conditions could be shortened, relieved or prevented, a great deal could be accomplished toward a happier convalescence.

Now it occurred to me that if the irritation caused by operations in the abdomen or pelvis would cause an arrest or reversal of peristalsis from the strong stimulation applied below, that if sufficient stimulation from above could be applied, arrest or reversal of peristalsis would not occur, hence a relief from nausea and vomiting. What more physiological stimulation to peristalsis is there than that of food?

The question of safety in early postoperative feeding occurred. But we know that in an enclosed cavity containing fluids or gases pressure applied anywhere within that cavity is transmitted in all directions without diminution. Hence pressure within a bowel, which is in the peritoneal cavity, is different from that without only by the strength of the intestinal muscle. I have not found any definite reference to the amount of pressure an intestine can exert by its own contraction, but it certainly is not anywhere near the pressure required to burst a bowel[3] and suture lines will hold more than that. The average pressure required to burst a bowel is 6.26 pounds per square inch and the lowest recorded is 2 pounds. Furthermore clean incisions into peritoneum heal very rapidly and plain catgut is not absorbed for about ninety-six hours.[5]

I had long given patients water by mouth immediately following operation, without any untoward effect even in stomach cases. This I found later was in agreement with such an eminent authority as Lord Moynihan,[4] who says, "There is no harm in giving fluids freely. If a patient can vomit without injury to the suture-line it is quite certain that fluids through an anastomotic opening can do no harm." Furthermore he states: "Fluid taken by mouth has to pass to the large bowel to be absorbed. The intestine is kept active and this is entirely an advantage." Alvarez doubts this last statement and in a personal communication says that fluid can most certainly be absorbed in the small intestine.

I have found also that the discomfort following operation and the usual subsequent starvation induced much swallowing of air and suspected, as Alvarez[2] and Wangensteen[6] have shown, that a great deal of air may be swallowed, as much as 500 c.c. at one time and 3,000 c.c. in twenty-four hours being not uncommon. This is one cause of flatulence, perhaps the main one.

Accordingly, before having all these facts proven I began giving patients water freely as soon as they asked for it and urged food upon them as soon as possible. The results were for the most part good. There was much less swallowing of air and consequently much less distention. Interestingly there also was a great deal less nausea, and peristalsis was soon established. This was so striking, as was the shortened hospital stay, that I decided to take 100 consecutive cases so treated to see if my impression was a fact.

Most operations today are performed in the abdomen and pelvis. So-called "clean cases" only are reported, as others are a special problem not to be considered here. For statistical purposes, herniæ, requiring longer confinement, are also excluded. The cases mentioned in the following figures were not picked but were taken as they came and no attempt was made to classify them under separate headings, as cholecystectomy, appendectomy and so on.

One hundred cases so treated showed the following: Twenty-four ate on the day of operation; fifty on the first postoperative day; twenty-one on the second; four on the third; and one on the fourth post-operative day. Forty-eight did not complain of gas pains at all. Twenty-five had mild gas pains the first day only and twenty-one had mild gas pains the first and second postoperative days. Four had mild gas pains the first three postoperative days, while two had severe gas pains more than three days.

Age made no apparent difference. The youngest patient was six years of age, the oldest seventy and the average age was 36.6 years. There were no postoperative herniæ in this series.

TABLE I

Of those who ate on:	Sat up	Got up	Dismissed
Day of operation	3.2 days	3.7 days	6.0 days
1st postoperative day	3.6 days	4.5 days	7.2 days
2nd postoperative day	4.2 days	5.2 days	8.1 days
3rd postoperative day	4.8 days	6.1 days	9.0 days
4th postoperative day	5.0 days	7.0 days	10.0 days

In 100 consecutive cases treated in the old orthodox manner, they began eating on the third postoperative day, got out of bed on the seventh day and left the hospital on the tenth day on the average. In these cases much more frequent recourse had to be made to enemata, pituitrin and such for relief of gas and nausea.

It seemed that the discomfort in the wound itself was less marked and that patients also moved about more freely in the first series. Also in that series no emboli nor respiratory infection occurred. Of course so small a number is no criterion but isn't it possible that the lessened pressure below the diaphragm made some difference?

Of course the use of modern anesthetics such as novocain and ethylene made early eating possible. But the innate conservativeness of the medical profession often has delayed the adoption of new methods long after they are shown to be possible and feasible. I think on the whole this is a desirable attitude but some one must pioneer.

This technic of early postoperative feeding is to be followed further unless future experiences make it seem unwise. However, all the indications are for its continuance. In fact, the early recovery from the operation and the greater comfort the patients enjoy make their mental attitude so very favorable that much of the horror of surgery is removed. It is a part of our duty to relieve suffering and prolong life and if in a small way this contribution does either, I shall be satisfied.

References

1. Alvarez, Walter C.: Mechanics of the Digestive Tract. 2nd edition. New York: Paul B. Hoeber, publisher, 1928.
2. Alvarez, W. C.: Problems of present-day gastroenterology. Am. Jour. Med. Science, 182, 4:441-454, 1931.
3. Burt, Con Amore V.: Pneumatic rupture of intestinal canal with experimental data showing mechanism of perforation and pressure required. Arch. Surg., 22:875-902, 1931.
4. Moynihan, B. G. A.: Preparation and treatment of patients operated for diseases of the stomach. Oxford Loose-Leaf Surg., Vol. II, Sec. II, Chap. I, 555-560. Oxford University Press, 1926.
5. Trusler, H. M.: Peritonitis. An experimental study of healing in peritoneum and therapy of amniotic fluid concentrate. Arch. Surg., 22:983-992, 1931.
6. Wangensteen, O. H.: Nasal Catheter Suction Siphonage; its uses and technique of its employment. Minn. Med., 16:96-100, 1933.

EDITORIAL

MINNESOTA MEDICINE

OFFICIAL JOURNAL OF THE MINNESOTA STATE MEDICAL ASSOCIATION

Published by the Association under the direction of its Editing and Publishing Committee

EDITING AND PUBLISHING COMMITTEE

J. T. CHRISTISON, Saint Paul A. S. HAMILTON, Minneapolis
E. M. HAMMES, Saint Paul T. A. PEPPARD, Minneapolis
WALTMAN WALTERS, Rochester

EDITORIAL STAFF

CARL B. DRAKE, Saint Paul, Editor
W. F. BRAASCH, Rochester, Assistant Editor
C. A. MCKINLAY, Minneapolis, Assistant Editor

Annual Subscription—$3.00. Single Copies—$0.25
Foreign Subscriptions—$3.50.

The right is reserved to reject material submitted for editorial or advertising columns. The Editing and Publishing Committee does not hold itself responsible for views expressed either in editorials or other articles when signed by the author.

Classified advertising—five cents a word; minimum charge, $1.00. Remittance should accompany order.

Display advertising rates on request.

Address all communications to Minnesota Medicine, 2642 University Avenue, Saint Paul, or 324 Fourth Avenue South, Minneapolis. Telephones: Nestor 1381 and Dupont 1013.

BUSINESS MANAGER
J. R. BRUCE, Saint Paul

Volume 18 JUNE, 1935 Number 6

The State Meeting

The annual meeting of our State Medical Association is the outstanding yearly medical event in the State. Each year the meeting seems to be larger and better than the year before, and this year's meeting promises to be no exception. The combined meeting this year with the Medical Section of the American Association for the Advancement of Science will result in the largest attendance in history.

The scientific sessions of our Association will occupy three full days, June 24, 25 and 26, which will include some joint meetings with the American Association for the Advancement of Science. The latter association will continue its program Thursday at the Mayo Foundation in Rochester and Friday morning at the University, and our members are invited to attend these meetings.

Another outstanding innovation of this year's meeting will be the participation of some fourteen distinguished speakers from outside the state, two of them brought here by the American Association for the Advancement of Science and the remainder by the State Medical Association and the various societies of specialists in Minneapolis and the state at large. Participation in the program by Minnesota physicians will be limited to those conducting clinics Monday and Wednesday mornings and the numerous scientific demonstrations and exhibits each day from 10 to 11 A. M. and 2 to 3 P. M. The reception of this innovation by the members will probably determine the type of future programs.

Attention should be called to the series of six lectures on subjects of an economic nature to be delivered by Mr. Theodore Wiprud, Executive Secretary of the Medical Society of Milwaukee County, Wisconsin. These lectures were so well received at Marquette University that they have been incorporated in the Medical School curriculum. The two lectures to be given each day will be discussed by Dr. R. G. Leland, Director of the Bureau of Medical Economics of the American Medical Association.

In lighter vein will be the Hobby Show displaying the avocations of many of our members. Perhaps some of the rest of us without hobbies will be led to imitate these confrères. The golf tournament Wednesday afternoon will attract a full quota.

The Women's Auxiliary is printing its own program of the various social events being arranged for visitors by the Hennepin County Auxiliary. The wives of members will find they have not been forgotten.

The ladies as well as the men are expected to attend the annual banquet and the evening of entertainment being provided by our hosts, the Hennepin County members, on Tuesday evening.

In the program which appears in abbreviated form in this issue, the long list of Technical Exhibitors has necessarily been omitted. It is they who are so essential to the financial success of our convention and we bespeak for them the patronage of our members.

The annual convention promises to be outstanding. Never before has the Association offered such an array of medical celebrities, and each guest will be allowed the greater part of an hour to present his message. It behooves the members to take advantage of this unusual opportunity.

The Ramsey County Diamond Jubilee

Seventy-five years have passed since the founding of the Saint Paul Academy of Medicine and Surgery. On March 1, 1860, a group of physicians consisting of D. W. Hand, Alfred Wharton, T. R. Potts, Samuel Wiley, J. H. Stewart, F. R. Smith, J. A. Vervais, William H. Morton, E. Braun and Francis Regnier, all of Saint Paul, and J. H. Murphy of St. Anthony (now East Minneapolis and at that time located in Ramsey County) met in rooms above George Benz's saloon on Third Street and formed their society.

Dues of $25.00 were paid by the members and the salary of the City Physician, the duties of which office were performed one month each year by each of the members of the society, was turned over to the society. A lot was purchased, a library started and a microscope procured. Then came the Civil War and after struggling through the trying times of the war period, the society was disbanded in 1866. This same nucleus of early practitioners, however, augmented by a few others, formed the Ramsey County Medical Society when it was founded February 14, 1870, as a component part of the Minnesota State Medical Association. This close connection between the Saint Paul Academy of Medicine and Surgery and the Ramsey County Medical Society was the excuse for the celebration of the seventy-fifth anniversary of the organization of the Saint Paul medical profession which took the form of a stag dinner staged at the Minnesota Club, May 18, 1935.

When our Historical Committee publishes the history of medicine in Minnesota it will be shown that medical societies existed in the state more than seventy-five years ago. An organization known as the Minnesota Medical Society was formed in 1853 and the Union Medical Society, composed of doctors in Minneapolis and St. Anthony, in 1855. While the lives of these two organizations were fleeting, the State Association dates its birth from 1853, when the Minnesota Medical Society was formed.

Much water has flowed over St. Anthony Falls since these beginnings of organized medicine in Minnesota, and during this period more progress has been made in the science of medicine than in all the years preceding. The article immediately following was written, on the occasion of the seventy-fifth celebration of the Ramsey County Medical Society, by Dr. William Davis, who has been practicing in Saint Paul since 1883. He knew many of the members of the early Minnesota medical societies and he speaks from personal knowledge of early medical practice in this community.

THE DIAMOND JUBILEE OF THE RAMSEY COUNTY MEDICAL SOCIETY

WILLIAM DAVIS, M.D.
SAINT PAUL

Before 1860 there had been no organization of doctors in this community, and when in that year it was decided to form a medical society only twelve men could be mustered for the purpose. They called the new society The Saint Paul Academy of Medicine and at once began to have meetings as regularly as possible. The next year came the war between the North and the South, and so many of its members entered the service of the government that the Academy languished, until in the year 1866 its regular meetings ceased, not to be resumed for four years when it was reorganized February 14, 1870, under the name of the Ramsey County Medical Society, an organization that flourishes today with a strong and active membership of more than three hundred.

The founders of the Academy all have passed away long since. They did good service for the city and county, one of their functions being to furnish a physician for the city. This they did by having each member take the service in turn. As Asiatic cholera was an almost annual visitor to Minnesota at that time, the care of the public health was of no small importance. Under the auspices of the Academy, courses of public lectures on sanitation were given for two winters. The lecturer was Dr. David Boswell Reed, who had taught this subject in the University of Edinburgh and had come to Saint Paul for the benefit of his health.

The census of 1870 gave Saint Paul a population of more than 20,000 and the new Society began with a charter membership of twenty-two. All of these men have died, the last one a year ago, but several of them practiced medicine long enough to be well remembered today, notably Drs. S. D. Flagg, C. E. Smith, J. H. Murphy and Alfred Wharton. The growth of the Society has been steady and there is a record of regular meetings up to the present day, a record to be proud of when the handicaps of its early years are considered.

When the writer joined the Society in 1883, Saint Paul would hardly have been recognizable by those who know it only as it is in 1935. To one coming from the older cities of the East, it looked particularly raw and crude. No street was paved; what sidewalks there were, were boards, often loose. In the wet weather of spring a sea of mud extended from walk to walk. In summer that mud became dust. The going was best in winter when a smooth coating of ice and packed snow made wonderful sleighing, which lasted so many days that up to 1900 even the fire apparatus was put on runners for at least part of the winter. These streets, when lighted at all, depended upon the feeble illumination of gas or oil lamps, reinforced at Bridge Square, Seven Corners, and the junction of the then Third Street and Summit Avenue by 100 foot masts surmounted by clusters of arc lights.

With many vacant lots intervening, the business streets showed a great variety of buildings, many of wood and occupied as residences, others built of brick or the local gray limestone, and rarely of ornamental sandstone. Few reached the height of four stories. The newest and most up to date office building was the Gilfillan "block," still standing on the southeast corner of Fourth and Jackson Streets. The principal hotels of that day have disappeared entirely. Only one bridge crossed the river, that at Wabasha Street, then constructed chiefly of wood. A forest of poles carrying overhead wires almost blocked the streets and sometimes hampered the firemen seriously. School buildings made no plan for cold weather ventilation and no provision for illuminating the desks properly. There were but two private hospitals: St. Joseph's, with only one of its present wings built, and St. Luke's, which was on Eighth Street and housed in a frame building that had but lately been a boarding house of unenviable repute. For a City Hospital there had just been acquired a private dwelling on the site of the present Ancker Hospital. There was no ambulance. Accident cases and the very sick were carried in the open police patrol wagon. While there were some women who made nursing a profession, the trained nurse as she exists today was unknown, and it was not until several years later that the first school for nurses was opened.

Local transportation was provided for by a few public hacks and by two short lines of one man horse-cars, or oftener mule cars, one line a few miles long on Seventh Street, the other pursuing a wandering route from Fourth and Wabasha Streets to the junction of Laurel and Dale. Between Saint Paul and Minneapolis trains ran on the steam railroads at half hourly intervals during the busy hours, less frequently at other times. Between the cities there were three lines of railroad, two over the Milwaukee (one via Fort Snelling) and one over the Manitoba, now the Great Northern.

To eastern eyes some of the manners and customs of Saint Paul fifty years ago were striking, to say the least. It was a surprise to find the numerous saloons and barrooms of the city visited freely and openly by the leading men, judges, lawyers, doctors, and business men. Among the customers might be found a policeman in uniform and that same policeman might be seen patrolling his beat under an open umbrella and smoking a cigar. Chewing tobacco was widely indulged in by all classes of society, as was shown not only by numerous brown stains on the widewalks, but also by the imposing array of cuspidors in all public places, particularly noticeable in the court rooms, where these receptacles were liberally provided for and often used by the bench, the bar, the jury, the witnesses, as well as by the spectators. In the bitter cold of winter women out of doors often were almost unrecognizable, their heads were so swathed in hoods, scarfs, and mufflers, to match which headgear they wore long dresses, numerous flannel petticoats, shoes laced or buttoned above the ankles and thick felt "Arctics." Warm clothing was indispensable where private vehicles were usually open ones and public vehicles made no provision agains the cold except a thick layer of straw on the floor.

Fifty years ago but little had been accomplished in the way of the sanitation of the city. A part of the lower levels were supplied with water from Lake Phalen by a gravity system. In the same area there were sewers, but many of the abutting buildings were not connected. A considerable number of surface wells were in use, and outside the sewered streets cesspools and sometimes privy vaults were the only accommodations for drainage. Where there was no water laid, cisterns were depended upon or water was hauled in barrels. Many of the smaller shops threw their sweepings and refuse into the streets and sometimes slops would be emptied into the gutter. To try to keep dirt streets clean is discouraging anyway, and little effort was made in that line except just before elections.

Such was the environment of the Ramsey County Medical Society during its early years. These details are necessary to show how little there was to help and how much to hinder the proper care of the health of the community. The doctor of that day began his practice on foot; later, if he prospered, he acquired a horse with a buggy to drive in in the mild weather and a cutter when there was snow, with a buffalo robe to keep him from freezing. On long cold drives, for warmth he sometimes put a lighted lantern under the robe. Alighting from the vehicle to make a visit he anchored the horse with a strap and weight, blanketing the animal in very cold weather. The doctor's office was in a business building, frequently over a drug store, the druggist renting the whole building and subletting space to doctors. Such offices usually were heated by stoves and lighted by open gas jets or kerosene lamps. Few offices had attendants before the middle of the eighties, when the trained nurse began to appear. As the telephone came along the doctor was among the early subscribers, but even up to 1885 many offices were not connected with it. More often calls came in over the telephone of the druggist downstairs. Calls by telephone, however, were not numerous. The patient usually came directly to the office, and the caller at the house rang the doorbell, for the telephone was a luxury and not yet in general use. Some calls over the telephone, particularly at night, came from fire engine houses where the neighbors were allowed to use the telephone only to call a doctor.

Between 1880 and 1890 the population of the city increased more than threefold, from 41,000 in 1880 to 133,000 in 1890. The Society grew in full proportion to this growth but the attendance at the meetings left much to be desired. Having no rooms of its own, the

Society was obliged to meet around in the offices of its members, for the most part in small, dimly lighted, and generally unattractive surroundings. The doctor coming home tired to his evening meal can be drawn out to a society meeting only by a high sense of duty. Moreover the small attendance led to dull meetings. Napoleon said that an army travels on its stomach. It seems as though this were true of doctors also, and that they travel to society meetings on their stomachs, for when soon after 1890 the society meetings were preceded by a dinner the attendance jumped up amazingly, and later on, since it has had its own quarters, a library, and a laboratory, it has flourished like a green bay tree.

The last seventy-five years have seen greater permanent advance in the science of medicine than had been made in all the preceding ages. Some of the most devastating diseases have been wholly or largely suppressed. Even as late as 1884, the mayor of Saint Paul, the late C. D. O'Brien, addressed this Society on the need of making preparations for a threatened visit of cholera the next summer. It is necessary only to mention other great epidemic diseases that periodically brought death and destruction to all parts of the globe, but that are now well under control. Foremost among these were the plague, typhus, and yellow fever. In the subjugation of the last named disease an important part was played by the late Dr. Walter Reed, once a resident of Saint Paul and a member of this Society. As long as the misguided antivaccinationists can be kept from meddling, smallpox will not be dangerous. A sidelight upon what may happen to an unvaccinated community is shown in the records of the Ramsey County Medical Society for 1883, where there is published the report of one of its members, Dr. Burnham, who was sent to help handle an epidemic of smallpox in McConleyville, Wilkin County. He found a population strongly opposed to vaccination for the prevention of the disease and to fresh air and cleanliness for the care of the sick. By persuading the people to be vaccinated he got the disease under control, but not before there had been twenty-five cases with the enormous mortality of eighteen deaths, the cases all being of the virulent, confluent variety. Dr. Burnham makes this significant statement: "No person who could show the slightest scar (of vaccination) died of the disease."

The above list includes only leading epidemic diseases whose toll of deaths was enormous in past times. There are other important diseases in whose prevention and cure there have been great advances. The early members of the Ramsey County Medical Society were called upon to fight diseases that were chiefly seasonal. In summer there was cholera infantum, in the autumn typhoid fever, in cold weather pneumonia and diphtheria, while tuberculosis of the lungs prevailed the year round. The disease that led the death list was cholera infantum, a term that is found no longer in the International List of Causes of Death, the cases then reported under it being now included under the heading "Diarrhea and Enteritis," with a mortality that today is comparatively insignificant. In the eighties, however, the diseases of this class caused more than twice as many deaths as the next on the list—pneumonia; third in the order of mortality came typhoid fever, followed by tuberculosis of the lungs and then diphtheria. In proportion to the population, puerperal fever had a great mortality, ten times that of today.

In surgery, progress has been really wonderful. Almost up to 1880 operations were limited chiefly to amputations and the removal of tumors on the surface of the body. Except to repair accidental injury it was almost criminal to open the abdomen, the skull, the chest or a joint. It is necessary only to hint at the contrast between that surgery and the surgery of today. Two members of the Society were pioneers in the performance of operations that are now common. The first operation on the gall bladder that is recorded in this country was reported to the Society in October, 1886, by Dr. Justus Ohage, still an honored member. A few years later another member, the late Dr. Shimonek, removed a diseased appendix in the interval between attacks. He knew of no previous similar operation.

To the late Dr. Edouard Boeckmann more than to any one man, the Society owes its present prosperity. Joining the Society in May, 1893, he announced at once that it was his ambition to see the Society meeting in its own rooms, publishing its own medical journal, and equipped with a library and a laboratory. These objects were accomplished so promptly that in 1899, when he read his address as retiring president, the Society had its own rooms, library, and laboratory and was publishing its own journal, *The Saint Paul Medical Journal,* whose successful career from 1899 to 1917 ended only when MINNESOTA MEDICINE began publication. There is a further word to be said about the laboratory. Dr. Boeckmann made to the Society a present of his own method of preparing catgut for surgical use. For more than thirty years the laboratory has carried on the manufacture of this catgut with great success, the product being universally recognized as of the highest excellence, its sale producing a large profit that is used chiefly for the maintenance of the library together with its much used reading room.

UROTEX

According to the formula on the label, Urotex consists of two tablets, A and B. Tablet A (gray) contains hexamethylenamine, ext. nux vomica, acid benzoic, and atropine sulphate. Tablet B (brown) contains ext. buchu, ext. corn silk, ext. triticum, pot. bicarbonate, sodium borate, caffeine and atropine sulphate. These formulas represent the shotgun type of proprietary sold to physicians in the period preceding 1906, except that the composition appears on the label. The product has not been submitted to the Council on Pharmacy and Chemistry for consideration. It goes without saying, however, that the Council would not approve such a product. (*Jour. A. M. A.,* February 17, 1934, p. 561.)

MEDICAL ECONOMICS

Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association

B. J. Branton, M. D.
J. A. Moga, M. D.
W. F. Braasch, M. D., Chairman
J. C. Michael, M. D.
A. N. Collins, M. D.

County Society Plans

In token of the fact that the American Medical Association's House of Delegates was not called just to pass idle resolutions at its recent special session, a conference of representatives from every state for the purpose of making a practical study of plans for medical service controlled by county medical societies met in Chicago in May.

The House of Delegates, in its endorsement of the report of its Reference Committee, went on record as definitely favoring the development and institution of such plans—plans suited to individual community needs and eliminating the special features of the pre-payment insurance plans that met with the disapproval of the delegates.

Some very interesting tabulations of types of medical service now in operating with county medical society participation or control are available as a result of this meeting.

They provide an interesting answer to the familiar complaint that organized medicine just "sits back and does nothing"; that it "objects to all plans proposed for better distribution of medical care but it offers no plan of its own."

Many Experiments

Organized medicine is now participating in eight different types of experiments for better provision of medical and hospital care mostly for low income groups, industrial groups or the indigent.

These experiments are scattered from New York to California and in all of them the local County Medical Society coöperates in the control or officially associates itself in some fashion with the project.

Each one of these experiments differs widely from the other in the details of organization and sponsorship though many are of several years standing and have taken their places as essential community institutions.

Each one has been fitted into an especial need of the community and could not be transplanted to any other community.

It seems obvious, therefore, that the creation of one plan for distribution of medical services for the entire United States would be difficult, not to say impossible.

It is obvious, also, that organized medicine is not sitting back. It is making its answer to the problems presented by modern social and economic dislocations on many different fronts.

Practical Ways and Means

True, the attack has not been spectacular. It has not been prefaced by any great amount of expensive testimony of questional accuracy to self-evident general truths: to wit, that many people do not receive all of the medical care that the idealist could wish; that today some communities and some classes need the aid of an organized scheme to assist in the proper distribution of medical service.

But while the professional idealists were making studies to establish these general truths, the doctors in many corners of the country were already considering practical ways and means to achieve practical results in improving specific conditions in their own communities.

The American Medical Association through its House of Delegates has publicly disapproved of any and all schemes that include compulsory contributory aspects. At the same time, it is now preparing to give every possible aid and encouragement to the local community projects sponsored and controlled by county medical societies.

Plans are Fluid

These are practical plans designed to meet immediate individual needs and requiring no new social legislation and no revolution in traditional American methods of medical practice to put them into effect.

In addition they are fluid; easily scrapped or changed as experience may dictate abandonment or change.

If they do not work as they are, some modification of them undoubtedly will work. And in the meantime America is not irrevocably committed, as England is now committed, to the doubtful beneficences of an expensive system of health insurance.

Advice from Chicago

Practical advice came out of the Chicago conference on medical society plans.

Ambitious societies were counseled first to take no steps toward any experiment whatever without a thorough preliminary study of existing facilities and the need for improvement or change.

This study should be made by medical societies themselves, the bulletin on the subject cautions; previous studies by social workers should *not* be accepted.

Before any new machinery is created or any fundamental change made in the organization of medical services in any locality it is worth while to consider to what extent the situation may be met by adjustments of local fee schedules.

Could such adjustments include special fees for low-income classes with provision for determining economic status? Such graduated fee scales already exist in many states for the care of the indigent, for workmen's compensation service, and sometimes for other special classes.

About Existing Plans

The following main points should be answered in full before any plans are laid whatever.

1. What are the present methods used for providing medical care for the indigent? Is any existing plan capable of extension into a more general medical plan either in scope or in methods of operation?
2. What are the conditions of operation of hospital and clinic service? Is any plan of group hospitalization in existence and what are the relations to it of the County Medical Society?
3. What types of industrial practice exist in the community? Are they conducted according to the code of ethics?
4. Are there any appreciable sections of the population that are not now receiving medical service which they deserve?
5. What machinery is to be provided for determining the patient's ability to pay and for collecting medical fees? Is there any system of collecting or financing medical fees through County Medical Society now in existence?
6. Is there a necessity for medical service for special groups, crippled children, cancer patients, the tuberculous, blind, deaf, etc.?
7. What activities in the way of preventive medicine (immunization, etc.) or for school health are now being conducted by the County Medical Society?

Must Suit Locality

All of these problems should be investigated. All will not be, of course, of equal importance in any one locality. It will not be generally advisable to attack all of them at once in any new plan for medical service.

It is advisable, however, to investigate them all and to keep in mind the possibility of later inclusion of several or all of these phases of medical practice in any plan that may be organized.

"One of the advantages of County Medical Society control, management and experience," counsels the Bureau, "is the possibility of suiting the experiment to the particular local problems and of altering the plan as conditions change or new problems arise. The impossibility of such flexibility is one of the great disadvantages of state and national compulsory legislation."

Practical suggestions as to organization of any contemplated services based upon results of the above study are appended and, no doubt, will be available from the American Medical Association to any County Medical Society that contemplates experimentation.

In Operation Now

Notable among the special plans already in operation in various parts of the country are the following:

New York County, N. Y.: A special low fee schedule has been agreed upon by medical society members to serve families of two with an income of $1,400 and $250 extra for each dependent or $900 for single persons. The city is to be districted for the purpose. A list of the physicians is maintained at each district headquarters and consultations provided at low rates.

Post-Payment Plans

A post-payment plan for providing medical service is offered by the Central Clinic Commission of San Diego including the County

Medical Society, the Community Welfare Council, the County and City Health Departments, the School Health Department, Navy Relief and two hospitals. It is designed for the low wage group. The clinic service of the commission investigates, fixes fees and terms of payments and routes patients. It does not collect fees but less than one per cent have failed to pay.

* * *

A post-payment plan is also in successful operation in Alameda County (Oakland), California, in which the County Medical Society coöperates with the County Board of Supervisors. The social service department, financed by the Board of Supervisors, investigates cases, sets fees subject to the physicians' approval and routes to physicians.

* * *

Another successful post-payment plan is in operation for the second year by the Wayne County (Detroit) Medical Society of Michigan. Exclusive control rests with the medical society in this instance (see details printed in the February issue in these columns). It includes complete medical and hospital service. Fees are fixed by the social service department employed by the society and collection is controlled largely through coöperation with employers.

* * *

In Allen County (Fort Wayne), Indiana, the County Medical Society is attempting to develop a plan for the indigent and low income group on a similar basis with the physicians participating, paid on a unit basis and about a 50 per cent fee. The plan is sponsored by the Community Chest which investigates, recommends to physician and pays part of the fee.

* * *

Nassau County, New York (Long Island), has a tumor clinic, an orthopedic consultation service, and a "Public Health Hour," all of which are designed for the indigent and low income groups and all under the ultimate control of the County Medical Society, and the immediate control, respectively, of the American Society for the Control of Cancer, the state and county tuberculosis sanatorium, the Public General Hospital, 195 physicians and 10 hospitals.

It is now proposed to extend this service to general medical care for the indigent, low pay and regular pay patients. A social service department will investigate part pay and indigent patients. Consultation privileges are to be available through the executive secretary of the society.

* * *

A post-payment plan is in operation in Washington, D. C., through a Central Admitting Bureau of the "Medical Dental Service Bureau," composed of directors of medical and dental societies. It is designed for low wage earners and fixes fees for them and assists in payments. In most respects this plan greatly resembles the Wayne County plan.

Washington Contracts

Pre-payment plans in Pierce and King Counties, Washington, are the outgrowth of medical services organized in lumbering days by the lumber companies and subsequently greatly abused by other private industrial concerns. These new plans are organized and controlled by the respective County Medical Societies.

In Pierce County the cost is defrayed on a pre-payment basis of $1.00 and $1.50 a month for complete medical and hospital service. There are 105 contracts and the physician is paid on the fee basis. The employe chooses him from a posted panel.

In King County (Seattle) the same service is provided on much the same basis. But the income is distributed on the unit system with the physician receiving 60 to 70 per cent of the fees. There are 20,000 industrial employes under contract.

* * *

A medical Service Bureau of Utah State Medical Society has been proposed for the purpose of making contracts with low income groups on a pre-payment basis. The plan has been adopted by the House of Delegates. No group hospitalization is contemplated at present.

* * *

The County Medical Society of Fulton County (Atlanta), Georgia, offers pre-payment medical care to families with monthly incomes of from $120 to $150 depending on the number of dependents. For single individuals the rate is $95. This service includes complete home service but excludes hospital and nursing care with the exception of special rates for maternity work and tonsillectomies. The cost is $1.50 a month for the first member of the family; $1.00 for the second and 50 to 75 cents for others with a $1.00 enrollment fee.

Group Hospitalization

Group hospitalization plans are in operation with medical society endorsement in Cleveland, New York City, Washington, D. C., and St. Paul.

* * *

In Iowa three County Medical Societies in Black Hawk (Waterloo), Clinton and Johnson counties have contracts with county boards of supervisors to give full medical care to the indigent. In Black Hawk the medical society is paid a lump sum of $3,500 a year which is used for general society work, dues, etc. The work is rotated and none goes to individual practitioners. The scheme has been in operation here for 25 years. In Clinton county work is rotated among member physicians. Overhead plus a sinking fund of $50 a month is deducted and the physician gets a maximum of $150 a month from remaining funds. Rates paid by the county supervisors are 50 per cent of regular fee schedule. In Johnson county the work is done largely through the University staff.

Indigent Care

At Battle Creek (Calhoun County), Michigan, all care of the indigent is now given by medical or dental society members who report their work to social service workers for investigation. If approved, the bill goes to the Director of Social Relief for pro-rata payment out of general funds. All free clinics have been abolished.

* * *

There are special services in coöperation with Health Departments for immunization, smallpox vaccination, etc.; physical examinations, tuberculosis and cancer campaign, forms of school service, health education, child health and county tonsil clinics, etc., in Detroit and Cleveland.

* * *

There are plans for regulation of hospital, clinic and dispensary admissions with the County Medical Society participating in Cleveland, Mondore county, Rochester, N. Y., Philadelphia and Binghamton, New York.

* * *

All care of the indigent in Easton and Bethlehem and Allentown, Pennsylvania (Northampton County), is now done under the direction of the Public Relations Committee of the Northampton County Medical Society, thus saving the County Poor Directors more than $2,000 over the cost in 1933 under a contract plan.

Patients have free choice of physicians and the work is done by members on a fee schedule with arrangements for credit rating and extended payments.

Important to Members

At the recent session of the legislature two laws were passed that directly concern the medical profession. These laws are published verbatim below. The first one Chapter 165, a law requiring physicians and others to report all wounds caused by the discharge of a fire arm, when first introduced required the reporting of all knife wounds and all wounds made by a deadly weapon. In accordance with our suggestion the bill was amended so that it is restricted solely to the discharge of a fire arm, and it was further amended to provide that the report shall be confidential and that the physician shall not, by reason thereof, be subpœnaed, examined or forced to testify in court. The law in its present form is similar to the New York statute and a violation is punishable as a criminal offense. We suggest that the members of the medical profession familiarize themselves with this law by reading the same in order that they will not subject themselves to any such prosecution.

Chapter 359 authorizes every county board in this state to provide for the hospitalization in hospitals within the county or elsewhere within the state, of indigent persons.

The original University Hospital law provided that the University Hospital should be the primary and principal place to hospitalize the indigent. This wording resulted in some of the county attorneys ruling that it was the *only* hospital at which the indigent could be hospitalized. This in turn resulted in the passage of Chapter 393, Laws of 1933, which applied only to counties of a population of fifty thousand to seventy thousand inhabitants. The 1933 law made it mandatory to hospitalize the indigent in hospitals rated Class A by the American College of Surgeons. It also prevented the medical profession from being paid for their services and limited the hospital to a charge of one half the total charge at the University Hospital. The new law makes no restriction as to the hospital except that it be located within the State of Minnesota. It further provides that the cost of hospitalization shall not exceed the *full rate* charged at the University Hospital. This amount is exclusive of medical and surgical care. The purpose of this law is to remove any doubt as to the right of the Board of County Commissioners to provide for the hospitalization of the indigent.

A detailed report of the activities of your legislative committee has been submitted to the secretary of each component Medical Society. It will undoubtedly be called to the attention of members at their next regular meetings.

Committee on Public Policy and
Legislation
DR. H. M. JOHNSON, *Chairman.*

CHAPTER 359—H. F. No. 1408

AN ACT authorizing County Boards to Provide for Hospitalization of the Indigent of Such Counties, and Repealing Laws 1933, Chapter 393.

Be it enacted by the Legislature of the State of Minnesota:

Section 1. The county board of any county in this State is hereby authorized to provide for the hospitalization in hospitals within the county or elsewhere within the State, of indigent residents of such county who are afflicted with a malady, deformity, or ailment of a nature which can probably be remedied by hospitalization and who are unable, financially, to secure and pay for such hospitalization or, in the case of a minor, whose parent, guardian, trustee or other person having lawful custody of his person, as the case may be, is unable to secure or provide such hospitalization.

Section 2. Whenever the existence of a case described in Section 1 of this act shall come to the notice of the sheriff, town clerk, health officer, public health nurse, peace officer, public official, or physician or surgeon it shall be his duty to, and any other person may, file with the county auditor of the county of the legal residence of such indigent person requiring care an application for the hospitalization of such indigent person. Such application shall be made in such form as the county board of such county may prescribe, and shall contain the name, age, residence and physical condition of the person sought to be hospitalized and shall contain also a full statement of his financial situation and of the persons, if any, legally charged with his care and support, and such application shall be verified. The county board shall make a careful investigation of the matter in such manner as it shall deem advisable and expedient, and it shall be the duty of any public official of any county, city, village, or town of the residents of the person sought to be hospitalized to supply the county board on a request therefor all the information within his knowledge relative to the financial condition of the person sought to be hospitalized and of all persons, if any there be, who are legally liable for the support of such person. If after such investigation the county board shall be satisfied that the person on whose behalf the application is made is not financially able to provide himself with such hospitalization or in case of a minor, his parents, guardians, trustee, or other person having legal custody over him or legally responsible for his support and maintenance is not financially able to provide such hospitalization, then said county board shall direct the county physician or some other physician, to make an examination of the person on whose behalf such application was made. Such physician shall make and file with the county board a verified report in writing setting forth the nature and history of the case and such other information as will likely aid in the medical and surgical treatment of the disease, malady, deformity, or ailment affecting such person, and shall state in such report his opinion whether or not the condition of such person can probably be remedied at a hospital. Such report shall be made in duplicate, one copy of which shall be filed with the county auditor and the other shall be transmitted to the hospital at which such afflicted person is hospitalized; such report shall also give any information the examining physician shall have or acquire relative to the financial ability of the afflicted person to pay for the hospitalization and treatment of his disease, malady, deformity, or ailment, together with any other information such physician may deem helpful to the county board or the physician attending him.

If upon filing of such report and a full investigation of the application the county board shall be satisfied that the case is one which could be remedied by hospital treatment and that such afflicted person is financially unable to secure or provide the same for himself, and that the persons legally charged with the support and maintenance of such person, if any there be, are financially unable to provide such hospitalization, the county board may grant or approve said application. If the county board is not so satisfied, it may take additional testimony or make such further investigation as it shall deem proper and shall reject any application if it finds that the facts do not merit the expenditure of public money for the relief of such afflicted person. Upon the approving and granting such application and the relief therein prayed for, the chairman of such county board shall arrange for the hospitalization of such afflicted person. If the county board shall find that the applicant or the person legally responsible for his support and maintenance is not able to pay in full but is able to pay in part for such hospitalization at such hospital the county board may approve such application of such afflicted person on such terms of division of hospital charges and costs as it may deem equitable and just. The county board shall provide for taking such afflicted person to the hospital. Provided, however, that when a physician certifies that an emergency exists in any case, and that he believes that the person suffering is unable to pay for hospitalization such person shall be admitted to any such hospital upon the order of the chairman of the county board or upon the order of the county commissioner of the district in which such alleged indigent person resides; and thereafter an investigation shall be made in the manner herein before provided.

Sec. 3. The cost of hospitalization of such indigent persons exclusive of medical and surgical care and treatment shall not exceed in amount the full rates fixed and charged by the Minnesota general hospital under the provisions of Laws 1921, Chapter 411, and acts amendatory thereof, for the hospitalization of such indigent patients. The cost of the hospitalization of indigent persons under the provisions of this act shall be paid by the county of the legal residence of such indigent person at such times as may be provided for in such contract.

Sec. 4. Laws 1933, Chapter 393, is hereby repealed.

Approved April 29, 1935.

CHAPTER 165—H. F. No. 212

AN ACT to require Physicians, Surgeons, all persons engaging in the practice of healing, Superintendents or Managers of Hospitals, Nurses, and Pharmacists, whether such persons are licensed or not, to report to the proper law enforcement authorities, all injuries to patients inflicted by the discharge of a gun, pistol or other firearms, and making failure to comply herewith a gross misdemeanor.

Be it enacted by the Legislature of the State of Minnesota.

Section 1. Every physician, every surgeon, every person authorized to engage in the practice of healing, every superintendent or manager of a hospital, every nurse and every pharmacist whether such physicians, surgeons, persons engaged in the practice of healing, superintendent or manager of any hospital, nurse and pharmacist be licensed or not, shall immediately report to the proper police authorities as herein defined all bullet wounds, gunshot wounds, powder burns, or any other injury arising from, or caused by the discharge of any gun, pistol or any other firearm, which wound he is called upon to treat, dress or bandage.

Section 2. The report required by the preceding section shall be made forthwith by telephone or in person, and shall be promptly supplemented by letter, enclosed in a securely sealed, postpaid envelope, addressed to the sheriff of the county in which such wound is examined, dressed or otherwise treated; except that if the place in which such patient is treated for such injury or his wound dressed or bandaged be in a city of the first, second or third class, such report shall be made and transmitted as herein provided to the chief of police of such city instead of the sheriff. The office of any such sheriff and of any such chief of police shall keep such report as a confidential communication and shall not disclose the name of the person making the same, and the party making such report shall not by reason thereof be subpœnaed, examined, or forced to testify in court as a consequence of having made such a report.

Section 3. The requirements of this act shall not apply to a nurse employed in a hospital nor to a nurse regularly employed by a physician, surgeon or other person practicing healing where the employer has made a proper report in compliance herewith.

Section 4. Any person who violates any provision of this act is guilty of a gross misdemeanor.

Approved April 13, 1935.

More About German Health Insurance

Publication of the complete pamphlet "Will Germany Copy America's Mistakes?" by Gustav Hartz, styled as a labor economist and former Reichstag member of Berlin, in a recent issue of the *New York State Medical Journal,* has provoked a stormy debate lasting over several issues in the correspondence columns of the journal.

A résumé of the Hartz pamphlet was printed in these columns in the March issue of Minnesota Medicine.

Several of the letter writers have hotly charged Hartz with being a Nazi propagandist with a typical Nazi slant toward all prefascist social and labor movements in Germany.

Others, like Dr. Paul G. Frank, Kew Gardens, Long Island, while disclaiming any knowledge as to the motives of Mr. Hartz, concur heartily in his dissatisfaction with health insurance in Germany.

Says Dr. Frank in an interesting communication printed in the May 15 issue of the *New York Journal:*

Panel Doctor

"During the thirty years of my experience in Germany I witnessed a deterioration of the medical profession. It was gradual. It came about by the removal of sanctions of preferment by skill and the substitution of preferment by convenience. What I mean is that an insurance scheme soon becomes a business—it must do so to succeed, while the practice of medicine must be a profession to succeed at its best, and the two will not mix.

"In Germany the physician who was most adaptable to the advancement of the plans of the insurance officials and who most pleased the patient for reasons quite other than skill obtained the most rapid preferment. It is true that there were possibilities left that made it possible to adhere to higher standards—I, for instance, had such a possibility, being a specialist—but many men who might have gone far were ruined by the stultifying panel practice.

"He Must Live"

"In the late nineties at the university we did not much esteem the panel idea. In those early years of state insurance even the lay public knew these doctors to be second rate. Some years later when I left the University clinic I ceased to laugh at the panel doctor for I became one myself. My fee averaged 50 cents each for medical cases of three months' duration. Figure out for yourself how many of these I had to have to live decently, and figure also how much time I could give to each case. Of course, it goes without saying that a young man of high professional ideals does not think first of money, but first of his duty to his patient; yet he is forced under sickness insurance to make a decision between these two motives which often disastrously affects his attitude toward his work. It is only too easy to weaken for he must live. . . .

"The American people will do well to pause long before adopting sickness insurance, remembering that such a system once instituted is sure to perpetuate itself. I have been in this country a year and a half. Some of the hospitals here are the most wonderful I have seen anywhere in the world and I have travelled extensively in Europe. I wonder whether the quality of medical care given in the United States is not superior to that which is given in countries where insurance plans are in operation. . . ."

SERA Education

Mr. Henry Weiner of Saint Paul, SERA lecturer on current economic problems and economic theory, talked for one hour and a quarter one evening in May to a Farmer-Labor Club at Mechanic Arts high school in Saint Paul. Subject: "Socialized Medicine."

Mr. Weiner favors the socialization of medicine after the German plan in America and he said so. Students on the subject would have found nothing new or especially interesting in this talk—judging by a stenographic transcript. But the six men and women who were members of the club and who were not students of the subject, appeared to be interested. They asked questions.

Mr. Weiner, as a SERA speaker, paid for by federal funds, took on the color of an official government authority and his remarks undoubtedly appeared to have a semi-official character.

SERA officials in charge of the education department disclaim any knowledge of this particular appearance of their lecturer or of the subject on which he talked.

Mr. Weiner who is, incidentally, a graduate of the school of economics of the University of Minnesota, probably has a free hand in his selection and handling of economic subjects.

There seems to be no good reason, however, why enlightened physicians should not inquire into the character of lectures of this sort if they are proposed elsewhere and ask, at least, for more complete and exact presentation of a difficult and exceedingly controversial subject.

Inevitable Reactions

It was to be expected that the so-called "liberals" and liberal weeklies would find much cause for congratulation in the endorsement by the California State Medical Association of a plan for compulsory contributory health insurance in California.

The unfortunate repercussion of this action on the part of California will undoubtedly be felt in many remote corners of the country where the abnormal conditions which led to the action of the medical organization in California are entirely absent.

Note, as an instance of this inevitable reaction, the editorial comment that appeared April 10 in *The Nation:*

"In voting to support compulsory health insurance just two weeks and a day after a special meeting of the House of Delegates of the American Medical Association in Chicago re-affirmed opposition to it in all its forms, the California State Medical Association has given a spectacular rebuff to the conservative leadership of organized medicine. It is the first time in this country—perhaps in the world—that an important medical group has taken such a stand and it will do something to relieve the profession in this country from the stigma of short-sighted obstruction from which it has long suffered.

"The California vote was, in fact, a rebuff to state as well as to national officialdom . . . a rebellion of the rank and file that burst through the restraints of the usual do-nothing leadership . . . which will make it possible for California to avoid the mistakes and delays which have characterized the beginning of health-insurance schemes abroad."

The prejudice and misinformation inherent in this attitude of *The Nation* editors is obvious to every well informed medical man. It is not so obvious to the majority of lay readers of this scholarly radical weekly. Publications of the American Medical Association do not reach this lay public. Neither do the soberer reports of actual experience with health insurance abroad.

Mr. Kingsbury Leaves the Milbank Fund

Directors of the Milbank Fund have definitely and officially announced that John A. Kingsbury, leader and spokesman for the Fund for 22 years, has severed his connection with the Fund.

Differences of opinion as to policy with the Fund's directors were said to be the reason.

Various stories are told or intimated about the source of these differences. One is to the effect that the force of medical opinion began to exert itself in a practical way upon the Borden Company, source of income of the Milbank family. This story may have no foundation in fact.

Following is the note on the matter printed in *Better Times,* weekly welfare bulletin of the Welfare Council of New York City carrying news of all social work in the region of New York City:

"Mr. Kingsbury was Commissioner of Charities under the Mitchell Administration, spokesman for the Milbank Fund for 22 years and secretary since 1922.

"Following a trip through Russia where he saw its program of health insurance in operation (see *Red Medicine* by Mr. Kingsbury and Sir Arthur Newsholme), Mr. Kingsbury advocated adoption of a health insurance plan in the United States. The Fund, on the other hand, although indicating approval of some system of social insurance to cover the 'five major hazards,' has never endorsed compulsory contributory health insurance or any other plan to distribute costs of medical care."

Minnesota State Board of Medical Examiners

Minneapolis Quack Pleads Guilty to Unlawful Practice of Healing

State of Minnesota *vs.* Wm. M. Snyder

William M. Snyder, sixty-three years of age, entered a plea of guilty in the District Court of Hennepin County on May 1, 1935, to an information charging him with practicing healing without a basic science certificate. Snyder, who lives with his wife and two children at 3029 Park Avenue, Minneapolis, opened an office in his home to engage in the practice of healing. He claims to have studied medicine, chiropractic and naturopathy. The only diploma that he seems to possess is one for optometry.

The defendant charged $3.00 for an examination and $1.50 per treatment. He claimed to be an expert on diet and he also gave some light ray treatments. He stated that he had cured cases of cancer and tuberculosis and that he relied chiefly upon his ability to prescribe the proper diet to effect a cure.

When arrested Snyder admitted that he was not licensed to practice healing anywhere in the United States. Snyder has been in the City of Minneapolis about a year and previous to that time engaged in the practice of healing at Madison, South Dakota, and also at Sioux Falls, South Dakota. He claims that he has never been arrested previously for practicing healing. When arraigned before the Honorable E. A. Montgomery, Judge of the District Court, Snyder freely admitted his guilt and informed the Court that he could obtain a license to practice optometry in the State of

Texas, and that he desired to remove to that state with his wife and family. Judge Montgomery imposed a sentence of six months in the Hennepin County Jail but placed the defendant upon probation. The Court advised Snyder that in the event he practiced healing in any form in this state, he would have to serve his entire jail sentence.

The State Board of Medical Examiners wishes to express its appreciation for the coöperation shown in this case by Mr. Ed J. Goff, County Attorney of Hennepin County, and his assistant, Mr. L. A. Selover.

Indian "Doctor" Sent to Jail at Winona

State of Minnesota *vs.* Mells White

Mells White, alias Mike Roller, alias Marion Roller, alias Marion Royle, thirty-six years of age, a full blooded Osage Indian, giving Tulsa, Oklahoma, as his address, entered a plea of guilty to a charge of practicing healing without a basic science certificate on May 9, 1935, before the Honorable Karl Finkelnburg, Judge of the District Court at Winona, Minnesota.

Judge Finkelnburg sentenced the defendant to pay a fine of $200 or serve two months in the Winona County Jail. In default of payment of the fine the defendant was committed to the Winona County Jail.

Along in the fall of 1934 White came to Winona with his wife and represented himself in that community as the salesman for Viavi medicines, claiming that these medicines were manufactured in San Francisco and sold through a branch office in Chicago. On or about March 8, 1935, he diagnosed the case of one John Michalowski as ulcers and stated that he could cure it in forty treatments. He obtained $13.25 cash in advance and gave Mr. Michalowski some medicine in a capsule. He made seven or eight calls to the Michalowski home and when it became apparent that Mr. Michalowski was getting worse instead of better, a physician was called and Mr. Michalowski was removed to the hospital where he died on April 6, from cancer of the stomach. This defendant treated severel individuals in that community and following an investigation made by the State Board of Medical Examiners, a complaint was filed against him charging him with practicing healing without a basic science certificate. When arraigned in Municipal Court in Winona, he waived his hearing and was held to the District Court under bail of $500 which was not furnished.

Under the name of Marion Roller, this defendant served seven years, two months and six days in the Wisconsin State Prison at Waupun on a charge of carnal knowledge, having been sentenced by Judge Thompson, Hudson, Wisconsin, in April, 1926. Under the name of Marion Royle he served 110 days at the Indiana State Farm at Greencastle, Indiana, on a charge of carrying concealed weapons. Under the name of Mells White he pleaded guilty to two charges of practicing healing without a basic science certificate at Janesville, Wisconsin, in July, 1934. He was given a suspended sentence of $100 or ninety days on each of these charges.

While it is unlikely that this defendant will again attempt to practice healing in the State of Minnesota, after having served his jail sentence, the State Board of Medical Examiners respectfully requests that it be immediately notified if any such individual appears anywhere in the State of Minnesota. The Board also wishes to express its appreciation of the coöperation shown in this case by E. D. Liberia, County Attorney of Winona County, H. C. Riebau, Chief of Police of Winona, and Arthur C. Brown, Sheriff of Houston County, Minnesota.

List of Physicians Licensed by the Minnesota State Board of Medical Examiners May 11, 1935

April Examination

By Examination

Aldrich, Herrick John, U. of Minn., M.B., 1934, St. Paul, Minn.
Armstrong, Thomas D., Rush Med. Col., M.D., 1933, Rochester, Minn.
Baker, George Stansbury, U. of Maryland, M.D., 1933, Rochester, Minn.
Brunsting, Henry Albert, U. of Mich., M.D., 1930, Rochester, Minn.
Cusick, Paul Leo, Detroit Col. of Med. & Surg., M.B., 1931, M.D., 1932, Rochester, Minn.
Doyle, Thomas James, U. of Minn., M.B., 1934; M.D., 1935, Duluth, Minn.
Erickson, Alvin, U. of Minn., M.B., 1934, Des Moines, Iowa.
Erickson, Clarence Wilber, U. of Kansas, M.D., 1933, Rochester, Minn.
Erickson, Clifford Orvis, U. of Minn., M.B., 1934, St. Paul, Minn.
Hagen, Wayne Sigvart, U. of Minn., M.B., 1934, Kansas City, Mo.
Hanson, John Willard, U. of Minn., M.B., 1933; M.D., 1934; Minneapolis, Minn.
Harper, Robert Dana, U. of Minn., M.B., 1934; M.D., 1935; Duluth, Minn.
Heiberg, Olaf Marius, U. of Minn., M.B., 1934, Minneapolis, Minn.
Hoffman, Roy Albert, U. of Minn., M.B., 1934, St. Paul, Minn.
Iverson, Eleanor Beatrice, U. of Minn., M.B., 1934, Minneapolis, Minn.
Jensen, Reynold Archibald, U. of Minn., M.B., 1934, Minneapolis, Minn.
Johnson, Harold Clark, U. of Minn., M.B., 1934, St. Paul, Minn.
Keefe, Rolland Ellis, U. of Minn., M.B., 1934, St. Paul, Minn.
Kibler, Francis Elmo, U. of Colo., M.D., 1933, St. Paul, Minn.
Lange, William Anding, U. of Minn., M.B., 1934; M.D., 1935; Lake City, Minn.
Lodmell, Lenier Arthur, Northwestern, M.B., 1934; M.D., 1934; Chicago, Ill.
MacLean, Alexander Robinson, U. of Manitoba, M.D., 1934, Rochester, Minn.
McGreane, Norbert Arthur, U. of Louisville, M.D., 1934, St. Paul, Minn.
McKean, Robert Scott, Northwestern, M.B., 1932; M.D., 1933; Rochester, Minn.
Menville, John Gilmer, Tulane U., M.D., 1930, Rochester, Minn.
Miller, Marvin Jesse Arthur, U. of Minn., M.B., 1934; M.D., 1935; Pine River, Minn.
Moehring, Henry George, U. of Minn., M.B., 1935, Hovland, Minn.

Morgan, Hugh Owen, U. of Minn., M.B., 1934, St. Paul, Minn.
Nash, Leo Axel, U. of Minn., M.B., 1934, Minneapolis, Minn.
Nelson, Arthur Alfred, U. of Minn., M.B., 1934, Minneapolis, Minn.
Nelson, Wilburn Oliver Bennett, U. of Minn., M.B., 1935, Ironton, Minn.
Penk, Engward Louis, U. of Minn., M.B., 1934, Duluth, Minn.
Ripka, Emily L., U. of M., M.B., 1933; M.D., 1934; Minneapolis, Minn.
Schroeppel, John Earl, U. of Minn., M.B., 1935, Minneapolis, Minn.
Sher, David Adler, U. of Minn., M.B., 1934, Minneapolis, Minn.
Simonton, Kinsey MacLeod, Geo. Wash. U., M.D., 1933, Rochester, Minn.
Sowers, Bouton Franklin, U. of Mich., M.D., 1931, Rochester, Minn.
Stickney, James Minott, Jr., Rush Med. Col., M.D., 1934, Rochester, Minn.
Tillisch, Jan Henrik, U. of Minn., M.B., 1932; M.D., 1933; Rochester, Minn.
Trinkle, Albert Joseph, U. of Kans., M.D., 1933, Minneapolis, Minn.
Walsh, Maurice Nihill, Detroit Col. Med. & Surg., M.D., 1931, Rochester, Minn.
Wilmot, Cecil Alfred, U. of Minn., M.B., 1935, Duluth, Minn.
Wolff, Luther Horn, U. of Pa., M.D., 1932, Rochester, Minn.
Wood, George Archie, Stanford U., M.D., 1934, Rochester, Minn.
Wright, Wale Samuel, U. of Minn., M.B., 1934, Minneapolis, Minn.

By Reciprocity

Prendergast, John James, Loyola U., M.D., 1932, St. Paul, Minn.
de Berry, Ellett Morrison, U. of Texas, M.D., 1922, St. Paul, Minn.

In Memoriam

William Alison Lumley

1857-1935

Dr. William Alison Lumley, a practising physician of Minnesota and Wisconsin since 1894, died at his home in Ellsworth, Wisconsin, April 9, 1935, the day before his seventy-eighth birthday, after a six days' illness with lobar pneumonia.

Dr. Lumley was born in Ringwood, Illinois, and received his early education in the village school at that place. For several years he taught a rural school and operated a farm near Ringwood. In 1879, he was married to Jennie Vogel, and four children were born of this marriage, of whom two sons died in infancy.

It was thus later in life than most students that he studied Medicine, attending the Illinois College of Physicians and Surgeons in Chicago, from which he graduated in 1893. The same year his wife died, following which, in 1894, he located in Renville, Minnesota, for the practice of his profession. In 1896, he was married to Helen M. Lumley, and one daughter was born of this marriage.

In 1911, he moved to Ellsworth, Wisconsin, where he remained in active practice until the last few years, and even during this time, he attended the calls of some of his old friends and patients.

He is survived in his immediate family by his wife and a daughter, Mrs. Charles E. Campbell of Ellsworth, Wis., a daughter, Mabel E. Lumley, of Moorhead, Minn., and a daughter, Mrs. L. G. Smith, of Montevideo, Minn.

Dr. Lumley was a lifelong member of the Methodist Episcopal Church and was a member of the Masonic Lodge and his county and state medical societies.

He was a man of an exceptionally wide range of interest and reading outside as well as inside his profession; he was very public spirited and was a civic leader in both villages in which he had made his home. In his death, his community loses a valuable citizen as well as an excellent family doctor, considered in the oldest and best meaning of that term.

Arthur T. Mann

1866-1935

Dr. Arthur T. Mann was born in New York City January 21, 1866. Upon the death of his father in 1876 his family moved to Rochester, New York, and a little later to Eau Claire, Wisconsin. In the early eighties the family moved to Minneapolis and in 1888 Arthur Mann received his B.S. degree from the University of Minnesota. While at the University he helped organize and played on the first University of Minnesota football team. He also played on the baseball team.

Dr. Mann took his medical course at Harvard where he graduated *cum laude* in 1896. After a year's internship at the Channing Hospital in Brookline, Massachusetts, he served as house surgeon at the Boston City Hospital for two years and an additional year as resident at the Massachusetts State Hospital. Postgraduate work was taken later at Boston in 1902 and abroad in 1904 and 1914.

Beginning practice in Minneapolis in 1899, Dr. Mann became at once associated on the Minnesota Medical School faculty as Assistant in Surgery in 1899, Instructor in 1902, Clinical Professor in 1906, and Associate Professor of Surgery in 1913. He also was chief of the Surgical Service of the Minneapolis General Hospital from 1913 to 1922.

During the World War Dr. Mann served as Major in the Medical Corps and was Chief Surgeon at Camp Dodge. Following the war he was Surgical Consultant in the United States Public Health Service, when he performed an enormous amount of surgical work on former soldiers.

As Secretary-Treasurer of the Western Surgical Association for sixteen years and later as President he contributed largely to the growth of that society.

Medical society memberships included the Hennepin County Medical Society, the Minnesota State and American Medical Associations, Minneapolis Surgical Society, Minnesota Pathological Society, Minnesota Academy of Medicine and American College of Surgeons. He held membership in the Minneapolis Club, Woodhill Country Club and the Lafayette Club.

In 1904 Dr. Mann married Winona Orff, who survives him. By his death April 15, 1935, the medical profession loses one of its outstanding members from the standpoint of character and ability.

OF GENERAL INTEREST

Dr. A. W. Eckstein is back in Mankato. His many friends are glad to see him about again.

* * *

Dr. and Mrs. O. J. Seifert of New Ulm have returned from a three weeks' visit in California.

* * *

Dr. J. S. Shrader of Hollandale has purchased the practice of Dr. H. A. Schneider at Jordan, Minnesota.

* * *

Dr. L. R. Parson of Elbow Lake has opened an office at Fergus Falls for the practice of his specialty, urology.

* * *

Dr. E. C. Haagenson, formerly of Grand Forks, North Dakota, has opened offices at Shelley, Minnesota, for the practice of medicine.

* * *

Dr. K. E. Bergquist, formerly of Duluth, has moved to Battle Lake, Minnesota, where he will be associated in practice with his son-in-law, Dr. C. A. Boline.

* * *

Dr. Edward D. Greenberger, who has charge of the X-ray Department of the Mankato Clinic, was married Thursday, May 16. He married a Southern girl.

* * *

Dr. Marvin O. Henry addressed the members of the McLeod County Medical Society at Hutchinson, Minnesota, May 17, on "The Low Back Problem." Lantern slides were shown.

* * *

The Blue Earth County Medical Society held its annual meeting in May, and the surrounding counties were asked to participate. Dr. Albert Snell of the Mayo Clinic was the main speaker.

* * *

A new $150,000 receiving hospital will be erected at the St. Peter state institution as the result of action taken by the state legislature. Dr. George H. Freeman is superintendent of the institution.

* * *

Dr. William K. Jacoby of Evanston, Wyoming, was a recent visitor in Mankato. He used to practice in the vicinity. He reports conditions very good at his present location, and his health is excellent.

* * *

Dr. Henry E. Michelson, Professor of Dermatology at the University of Minnesota, was a guest of the physicians of Butte and Anaconda, Montana, on May 18. He gave a clinic and lecture on diseases of the skin and syphilis.

Dr. G. A. Dahl and Dr. J. T. Schlesselman of the Mankato Clinic took a fishing trip to Basswood Lake in Northern Minnesota, in May. The trip was essentially a fishing one, but moving picture operations were very much in evidence.

* * *

The alumni of the University of Minnesota and the Mayo Foundation attending the American Medical Association meeting at Atlantic City in June will meet for dinner at the Ambassador Hotel, June 12. Those attending will probably be entertained by the showing of some pictures of the champion 1934 Minnesota football team.

* * *

Dr. Fetterly, formerly an interne at St. Mary's Hospital, Duluth, now practicing in Minneapolis, was seen in Duluth recently, headed north to some real trout fishing. He reported that the flying fish in Southern Minnesota were too asthmatic to bite properly, incidental to silicotic gills developed during recent devastating dust storms!

* * *

Drs. P. G. Boman and M. G. Gillespie, with their wives, attended the meeting of the American College of Physicians at Philadelphia the week of April 29. They practiced an interesting diversion by dipping deeply by motor into the South, and visiting some of the ancient fields of battle of the Civil War and certain active fields of present engagement in Washington, D. C. The circuit home was made via New York. They reported our European metropolis as looking "Farley well."

* * *

Dr. Clifford T. Ekelund of Pontiac, Michigan, has been selected as Secretary of the Michigan State Medical Society, succeeding Dr. Frederick C. Warnshuis, who resigned to accept a similar position with the California Medical Association. Dr. Ekelund graduated at the University of Minnesota medical school in 1918. After graduation he served as resident at Minneapolis General Hospital and the following year as resident in Surgery at the University of Minnesota Hospital. He is the son-in-law of Dr. George B. Weiser, New Ulm.

* * *

The staff of Nopeming Sanatorium provided the program and staff rounds for an enthusiastic meeting of the St. Louis County Medical Society on the evening of May 9. The medical program was presented after a dinner at 6:30. A number of the Medical Auxiliary members espoused bridge, the while chest experts Lamont, Hedberg, Loewen and Laird divulged the intricacies of disposing of the phrenic on occasion; sedimenting bloods to denote degree of tissue destruction; guinea pig inoculations to decipher prognostic omens; the facts about sanatorium employees and their chests. All those present felt the doctors were well employed and their patients fortunate. The bridge was of an equally high Culbertsonian order.

MINNESOTA STATE MEDICAL ASSOCIATION

Eighty-second Annual Meeting

Minneapolis, Minnesota

June 24, 25, 26, 1935

OFFICERS

President—W. A. Coventry	Duluth
First Vice President—A. G. Chadbourn	Heron Lake
Second Vice President—E. S. Boleyn	Stillwater
Secretary—E. A. Meyerding	Saint Paul
Treasurer—W. H. Condit	Minneapolis

COUNCILORS

First District—H. Z. Giffin	Rochester
Second District—L. L. Sogge	Windom
Third District—H. M. Workman	Tracy
Fourth District—J. S. Holbrook	Mankato
Fifth District—G. A. Earl	Saint Paul
Sixth District—J. M. Hayes	Minneapolis
Seventh District—W. W. Will	Bertha
Eighth District—W. L. Burnap	Fergus Falls
Ninth District—B. S. Adams	Hibbing

COMMITTEE ON SCIENTIFIC ASSEMBLY

W. A. Coventry, *President*	Duluth
A. G. Chadbourn, *First Vice President*	Heron Lake
E. A. Meyerding, *Secretary*	Saint Paul

SECTION ON MEDICINE

F. H. K. Schaaf	Minneapolis
P. P. Vinson	Rochester

SECTION ON SURGERY

H. B. Zimmermann	Saint Paul
Harry Klein	Duluth

CLINICAL DEMONSTRATIONS

W. A. O'Brien	Minneapolis

LOCAL ARRANGEMENTS

James Kerr Anderson	Minneapolis

REFERENCE COMMITTEE

J. C. Hultkrans	St. Paul
S. H. Baxter	Minneapolis
A. G. Chadbourn	Heron Lake
C. O. Estrem	Fergus Falls
M. C. Piper	Rochester

WOMEN'S AUXILIARY TO THE STATE MEDICAL ASSOCIATION

OFFICERS

President—Mrs. Martin Nordland	Minneapolis
President-Elect—Mrs. J. F. Elias	Duluth
First Vice President—Mrs. E. M. Hammes	St. Paul
Second Vice President—Mrs. A. C. Baker	Fergus Falls
Third Vice President—Mrs. A. H. Sanford	Rochester
Recording Secretary—Mrs. B. R. Karn	Ortonville
Corresponding Secretary—Mrs. H. F. Wahlquist	Minneapolis
Treasurer—Mrs. J. F. Norman	Crookston
Auditor—Mrs. Neil S. Dungay	Northfield
Historian—Mrs. J. A. Thabes	Brainerd
Parliamentarian—Mrs. W. J. Byrnes	Minneapolis
Past President—Mrs. A. A. Passer	Olivia

PROGRAM

Business Session

THE LEAMINGTON

SUNDAY, JUNE 23

9:30—Council	East Room
Reference Committee	Queen Anne Room

SUNDAY EVENING

7:00—House of Delegates	Ball Room

MONDAY, JUNE 24

11:45—Council	East Room

TUESDAY, JUNE 25

11:45—House of Delegates (Luncheon)	Ball Room
11:45—Council	Queen Anne Room

WEDNESDAY, JUNE 26

GENERAL ASSEMBLY

10:55—Presentation of Officers	Lecture Hall Auditorium

ANNOUNCEMENTS

Scientific Exhibit Award: A medal has been donated by the Southern Minnesota Medical Association for the best scientific exhibit. The Scientific Demonstrations and exhibits shown in the exhibit hall are eligible.

Hobby Show: Hobbies of Minnesota physicians including paintings, wood carvings, musical scores, sculpture, stamp collecting, firearms, antiques, game trophies, trout flies, etc., etc., will be exhibited in Committee Room No. 3. These exhibits will be open from 8 A. M. to 6 P. M.

The Scientific and Technical Exhibits are located on the first floor of the Auditorium. These exhibits are of unusual interest and every member should arrange to spend some time visiting them. The exhibitors have gone to a great deal of effort in order to present to you medical subjects of special interest.

You are advised to read the list of Scientific Demonstrations and Exhibits over carefully, check them and make it a point to visit those you are interested in early.

The Women's Auxiliary is printing its own programs and the members should see that they obtain one so that they will not miss the delightful social events that have been provided by the Women's Auxiliary of the Hennepin County Medical Society.

MAKE YOUR HOTEL RESERVATIONS NOW!

Headquarters—The Leamington
Curtis Hotel across the street

Harry L. Alexander, M.D.
St. Louis, Mo.

Frank H. Lahey, M.D.
Boston, Mass.

Edmund Andrews, M.D.
Chicago, Ill.

William P. Murphy, M.D.
Boston, Mass.

Scientific Sessions

MONDAY, JUNE 24

Morning Session

UNIVERSITY OF MINNESOTA CLINICS

Diseases Characterized by Prolonged Fever
Hobart A. Reimann....................Minneapolis

Allergy in Childhood
A. V. Stoesser........................Minneapolis

Some Surgical Problems
W. T. Peyton........................Minneapolis

BIOLOGICAL EFFECTS OF THYMUS AND PINEAL EXTRACTS (HANSON)

Adolph M. Hanson........................Faribault

CITIZENS AID SOCIETY MEMORIAL ADDRESS

MONDAY, JUNE 24

Afternoon Session

THE PRESENT STATUS OF CLINICAL ALLERGY

Harry L. Alexander......................St. Louis
Associate Professor of Medicine, Washington University School of Medicine, and Associate Physician at Barnes Hospital.
Minneapolis Clinical Club, *Sponsor*

SOME OF THE NEWER DEVELOPMENTS IN HYPERTHYROIDISM AND HYPERPARATHYROIDISM

Frank H. Lahey.............................Boston
Director, Surgery Lahey Clinic
Surgeon-in-Chief to the New England Baptist Hospital and Surgeon to the New England Deaconess Hospital.
Minneapolis Surgical Society, *Sponsor*

THE PATHOGENESIS OF GALL-BLADDER DISEASE

Edmund Andrews...........................Chicago
Professor of Surgery, The University of Chicago and Attending Surgeon at the Billings Hospitals.

MONDAY EVENING

Northrop Memorial Auditorium, 8:15 P. M.

DISEASES OF THE BLOOD

William P. Murphy.........................Boston

TUESDAY, JUNE 25

Morning Session

SYMPOSIUM ON DISEASES OF THE BLOOD

THE RÔLE OF DRUG ALLERGY IN THE ETIOLOGY OF PRIMARY GRANULOCYTOPENIA

T. L. Squier.............................Milwaukee
Associate Clinical Professor of Medicine, Marquette Medical School, and F. G. Madison, Assistant Clinical Professor, Marquette Medical School.
A. A. A. S., *Sponsor*

THE RÔLE OF IRON IN THE TREATMENT OF ANEMIA

W. A. Bloedorn....................Washington, D. C.
Professor of Medicine and Executive Officer, Department of Medicine, George Washington University School of Medicine.
A. A. A. S., *Sponsor*

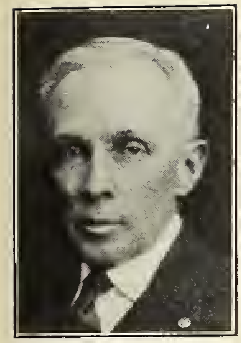
WHAT WE HAVE LEARNED ABOUT PERNICIOUS ANEMIA DURING TEN YEARS OF TREATMENT WITH LIVER

William P. Murphy.........................Boston
1934 Nobel Prize Winner in Physiology and Medicine; Instructor in Medicine, Harvard University Medical School; Senior Associate in Medicine, Peter Bent Brigham Hospital.
Hennepin County Medical Society, *Sponsor*

THE PREVENTION OF WHOOPING COUGH WITH BACILLUS PERTUSSIS VACCINE

L. W. Sauer..........................Evanston, Ill.
Associate in Pediatrics, Northwestern University Medical School
Northwestern Pediatrics Society, *Sponsor.*

Discussions:
Irvine McQuarrie, Minneapolis
O. W. Rowe, Duluth



Percy Brown, M.D.
Boston, Mass.

E. L. Sevringhaus, M.D.
Madison, Wis.

E. D. Plass, M.D.
Iowa City, Iowa

Thomas G. Orr, M.D.
Kansas City, Mo.

TUESDAY, JUNE 25

Afternoon Session

RUSSELL D. CARMAN MEMORIAL LECTURE

The Inception and Development of Fluoroscopy; The Influence of Carman on Its Status in America

Percy Brown.................................Boston
Minnesota Radiological Society, *Sponsor*

ENDOCRINE THERAPY

E. L. Sevringhaus...........................Madison
Associate Physician of Wisconsin General Hospital and Associate Professor of Medicine, University of Wisconsin.

SIMPLIFICATION OF OBSTETRIC CARE

E. D. Plass.................................Iowa City
Professor and Head of Department of Obstetrics and Gynecology, State University of Iowa

TUESDAY EVENING

ANNUAL BANQUET

Minnesota State Medical Association and Women's Auxiliary

The Leamington

6:00—Informal Dinner

8:00—Address of Welcome

J. M. Hayes.......................Minneapolis
President, Hennepin County Medical Society

President's Address

W. A. Coventry.......................Duluth

Introduction of President-Elect The Women's Auxiliary

Mrs. F. J. Elias.......................Duluth
President-Elect

8:30—Entertainment by Hennepin County Society and Auxiliary

"No Speeches — Colorful Entertainment — No Dull Moments."

Followed by dancing.

WEDNESDAY, JUNE 26

Morning Session

CLINIC

DYSENTERY: MEDICAL AND SURGICAL MANAGEMENT

1. Clinical Laboratory.................T. B. Magath
2. Roentgenology.....................H. M. Weber
3. Medical...........................J. A. Bargen
4. Surgical..........................C. F. Dixon

Mayo Clinic, Rochester

VENOCLYSIS—A CONSIDERATION OF ITS POSSIBLE DANGERS

Thomas G. Orr...............Kansas City, Missouri
Professor of Surgery, University of Kansas and Surgeon-in-Chief to the University of Kansas Hospital.

WEDNESDAY, JUNE 26

Afternoon Session

SUPPURATIONS OF THE NECK: CAUSE, DIAGNOSIS AND TREATMENT

John F. Barnhill.......................Indianapolis
Professor of Surgery of the Head and Neck, Indiana University of Medicine.
Minnesota Academy of Ophthalmology and Otolaryngology, *Sponsor*

THE PROGNOSIS AND TREATMENT OF CORONARY OCCLUSION

W. S. Middleton..........................Madison
Professor of Medicine, University of Wisconsin.

MEDICAL QUESTION COURT

W. A. O'Brien...........................Minneapolis
Chairman
A group of eminent specialists in the various lines will assist Dr. O'Brien.

Scientific Cinema

MONDAY-TUESDAY-WEDNESDAY

Morning Sessions

Canti and Chambers Films

F. L. Rector, Lecturer....................New York
Courtesy American Society for the Control of Cancer

J. F. Barnhill, M.D.
Indianapolis, Ind.

W. S. Middleton, M.D.
Madison, Wis.

Theodore Wiprud
Milwaukee, Wis.

A Short Course in Medical Economics

Mr. Theodore Wiprud.......................Lecturer
Executive Secretary of The Medical Society of Milwaukee County and lecturer on Medical Economics at Marquette University School of Medicine, Milwaukee.

Discussion:

Mr. R. G. Leland.
Director of the Bureau of Medical Economics of the American Medical Association, Chicago.
Mr. A. M. Calvin, St. Paul.
Mr. A. G. Stasel, Minneapolis.
Mr. Herbert H. Keefe.

Subjects:

Medical Economics, Business Methods, and Investments.
Medical Charity: Where Should It Stop?
Fair Competition Among Physicians.
Contract and Panel Practice.
Health Insurance.
Organized Medicine Meets Current Problems.

Mr. Wiprud will present this course of six lectures, two daily. The present economic problems that are facing the medical profession will be discussed, as will also practical methods of business management of the physician's office.

Physical Therapy

Howard A. Carter..........................Lecturer
Secretary of the Council on Physical Therapy of the American Medical Association, Chicago.
Demonstrational lecture using physical apparatus to illustrate the production of high frequency currents; also showing the relation between mechanical, electrical and heat energy. Discussion of the meaning of certain physical electrical concepts and units.

Afternoon Sessions

Female Sex Cycle

L. F. Hawkinson, Lecturer..................Brainerd
Courtesy Schering Corporation, Bloomfield, N. J.

The Management of Strabismus

Walter H. Fink, Lecturer................Minneapolis

First Aid Treatment of Fractures by Improvised Splints for the Purpose of Transportation

Willis C. Campbell, Producer........Memphis, Tenn.
E. T. Evans } Lecturers ....Minneapolis
P. W. Giessler }

Magnet Operation for Removal of Steel and Acute Mastoidectomy

Charles N. Spratt, Lecturer...........Minneapolis

Hygiene of Swimming

H. M. Taylor, Producer...........Jacksonville, Fla.
Horace Newhart, Lecturer..............Minneapolis

Isolation Techniques in Nursing

Communicable Disease Department, Minneapolis General Hospital, taken under the direction of Erling S. Platou and Ruth Johnson, R.N.

Scientific Exhibits and Demonstrations

Activities of Gillette State Hospital

American Medical Association

Hospitals in the United States

R. G. Leland, Director
Thomas G. Hull, Ph.D., Director of Exhibits

Physical Therapy, Application of

M. E. Knapp, Medical Associate, Minneapolis
Mr. Howard A. Carter, Secretary, Council on Physical Therapy

Biologic Exhibit

United States Public Health Service, Washington, D. C.

Biological Photographic Association Traveling Salon

Mr. John M. Muir, Oak Terrace

Cancer

F. L. Rector, Field Representative, Evanston, Ill.

Carbon Monoxide Poisoning

F. J. Elias, Duluth

Cardiac Standstill—Prevention and Treatment

M. H. Nathanson, Minneapolis
Under the auspices of the Minnesota Public Health Association Heart Committee.

Cardio-Amplifier and Heart Sound Tracings

Paul F. Dwan, Minneapolis

Childhood Infectious Disease, Prevention and Treatment of

Erling S. Platou, Minneapolis

Childhood Rheumatism in Minnesota, Natural History of

M. J. Shapiro, Minneapolis

Civilian Conservation Corps
Model of a typical camp hospital with the "war chest" equipment now in use, which is the same as that used by the medical corps in the war.
Station Hospital Staff, Fort Snelling

Deafness Prevention and Amelioration
Committee on Prevention and Amelioration of Deafness of the Minnesota State Medical Association

Dental Health
Minnesota State Dental Association
W. A. Dvorak, D.D.S., Chairman, Oral Hygiene Committee

Diseases of the Hip Joint
V. L. Hart, Minneapolis

Effects of Early Postoperative Feeding
O. I. Sohlberg, St. Paul

Elliott Treatment for Pelvic Inflammatory Processes
W. A. Hanson and L. H. Fowler, Minneapolis

Endocrine Studies
L. F. Hawkinson, Brainerd

Eyes in Diabetes, Related Conditions in the
Minnesota Academy of Ophthalmology and Otolaryngology and Associates

Factors in Life Expectancy of Our Citizens
Minnesota Department of Health, A. J. Chesley, Secretary and Executive Officer

Child Hygiene, Division of
E. C. Hartley, Director

Preventable Diseases, Division of
Orianna McDaniel, Director

Sanitation, Division of
Mr. H. A. Whittaker, Director

Vital Statistics, Division of
Mrs. Gerda C. Pierson, Director

Hernia, Injection Treatment of
A. F. Bratrud, Minneapolis

Immunization
Under the auspices of the Minnesota State Medical Association Committee on Public Health Education

Mayo Foundation for Medical Education and Research

Asthma
L. E. Prickman

Diabetic Patient
R. M. Wilder
Under the auspices of the Minnesota State Medical Association Committee on Diabetes

Diaphragmatic Hernia and Intrathoracic Tumors
S. W. Harrington

Diaphragm of the Dog
W. S. Lemon, G. M. Higgins, Ph.D., and A. S. Graham

Fever Therapy
A. U. Desjardins and W. C. Popp

Idiopathic Steatorrhea (Nontropical Sprue)
A. M. Snell, J. F. Weir, J. D. Camp, C. H. Watkins, Mildred Adams, Ph.D.

Medical Auxiliary
Mrs. S. S. Hesselgrave, St. Paul, Chairman of Exhibit
Mrs. James Blake, Hopkins, Co-chairman
Mrs. W. B. Roberts, Minneapolis, Chairman, Press and Publicity

Minneapolis Public Health
F. E. Harrington, Commissioner of Health

Minnesota Medicine
Exhibit arranged by Mr. J. R. Bruce, publisher

Minnesota Public Health Association

Minnesota State Board of Medical Examiners

Minnesota State Medical Association Committees

Cancer
Martin Nordland, Chairman, Minneapolis

Deafness Prevention and Amelioration
Horace Newhart, Chairman, Minneapolis

Diabetes
R. M. Wilder, Chairman, Rochester

Hospitals and Medical Education
C. A. McKinlay, Chairman, Minneapolis

Industrial Relations
J. M. Hayes, Chairman, Minneapolis

Medical Economics
W. F. Braasch, Chairman, Rochester

Public Health Education
See demonstration on Immunization, under the auspices of this committee.
L. R. Critchfield, Chairman, St. Paul.

State Health Relations
T. H. Sweetser, Chairman, Minneapolis

University Relations
F. J. Savage, Chairman, St. Paul

Nursing the Community
Minnesota Nurses Association

Parent-Teacher Health Program
Mrs. C. L. Hayes, Chairman, "The Summer Round-Up," Minnesota Congress of Parents and Teachers

Physical Therapy
M. E. Knapp, Minneapolis

Professional Pharmacy
Under the auspices of the Interprofessional Relationships Committee of the Minnesota State Pharmaceutical Association

Strabismus, The Management of
Walter H. Fink, Minneapolis
Under the auspices of the Minnesota Academy of Ophthalmology and Otolaryngology

Thymus and Pineal Extracts (Hanson)
An exhibit of live animals to demonstrate the effects of Thymus and Pineal Extracts (Hanson). Arthur Steinberg, Ph.D., of the Philadelphia Institute for Medical Research, will be present to discuss the experiments.
L. G. Rowntree, A. M. Hanson, J. H. Clark, and Arthur Steinberg, Ph.D.
Philadelphia Institute for Medical Research and Hanson Research Laboratory, Faribault, Minnesota

Trichomonas Vaginalis
W. A. Coventry and R. J. Moe, Duluth

Tuberculosis of the Ear
Wax Models
S. S. Cohen, Glen Lake Sanatorium, Oak Terrace

Tuberculosis of the Mouth
Wax Models
F. L. Jennings, W. L. Wilson, D.D.S., and J. C. Bryant, D.D.S., Glen Lake Sanatorium, Oak Terrace

Tuberculosis School Surveys
H. Longstreet Taylor Foundation, Pokegama Sanatorium, Pokegama

University of Minnesota

Benign Tumors of the Stomach
L. G. Rigler and L. G. Ericksen

Chest Development, Models Showing Normal and Abnormal
S. A. Weisman

Contrast Media in Roentgen Diagnosis
L. G. Rigler

Diphtheria Prevention, Progress in
Ruth E. Boynton, Student's Health Service

Hay Fever Causes for Minnesota
R. V. Ellis, C. O. Rosendahl, Ph.D., and A. O. Dahl, M.S.

Tularemia in Man and Animals
R. G. Green

Varicose Veins and Ulcers
H. W. Froehlich and Staff, Minneapolis General Hospital

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for June

The Minnesota State Medical Association Morning Health Service.

The Minnesota State Medical Association broadcasts weekly at 10:30 o'clock every Tuesday morning over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month will be as follows:

June 4—Your Heart.
June 11—Chorea.
June 18—As We Grow Older.
June 25—Vacation Time.
(Watch for probable change of time.)

Mississippi Valley Medical Society

A new medical organization to be known as the Mississippi Valley Medical Society was formally organized at Quincy, Illinois, on April 8. The sole purpose of the new soceity is to hold an annual meeting each fall devoted to intensive postgraduate instruction and conducted by the leading clinical teachers of the United States. The programs will be eminently practical and of particular interest to the general practitioner.

The society will especially appeal to the physicians of Illinois, Missouri, and Iowa, and the annual meetings will be held in cities on the Mississippi River in these states. The first meeting will be held in Quincy during the month of October or November and will be a three-day session. The society has already been approved by the Adams County Medical Society of Illinois (Quincy), and the Marion-Ralls County Medical Society of Missouri (Hannibal).

The control of the organization is in the hands of a Board of Directors, consisting of one director to each 1,000 physicians in the states of Illinois, Missouri, and Iowa. The officers elected to serve for 1935 are: President, Dr. Walter Stevenson, Quincy, Ill.; president-elect, Dr. H. B. Goodrich, Hannibal, Mo.; first vice president, Dr. H. P. Coleman, Canton, Ill.; second vice president, Dr. E. A. Cunningham, Louisiana, Mo.; third vice president, Dr. Wm. Rankin, Keokuk, Iowa; secretary-treasurer, Dr. Harold Swanberg, Quincy, Ill.

An Advisory Committee including the following prominent physicians has been elected by the Board of Directors: Dr. Walter Bierring, Des Moines, president of the American Medical Association; Dr. Allen Pusey, Dr. A. D. Bevan and Dr. Malcolm Harris, Chicago, past presidents of the American Medical Association; Dr. Charles B. Reed, Chicago, president-elect of the Illinois State Medical Society; Dr. E. Lee Miller, Kansas City, president-elect of the Missouri State Medical Society; Dr. Thomas A. Burcham, Des Moines, president-elect of the Iowa State Medical Society.

Membership in the society will be open to all ethical physicians, it being a prerequisite that all members hold membership in their respective state medical societies. In order to get started quickly, the Board of Directors has elected to place the membership fee and dues for the first year at only $3.00 and life membership at $25.00, provided these are paid before the time of the annual meeting. Charter membership will close July 1, 1935. Members will attend the annual meetings without payment of a registration fee.

The Board of Directors is desirous of securing one thousand physicians as charter members in order to provide a caliber of program at the Quincy meeting that has never been equalled in this section of the Mississippi Valley. Ethical physicians interested in the new organization are urged to communicate with Harold Swanberg, M.D., secretary-treasurer, 211-224 W. C. U. Bldg., Quincy, Illinois.

Great Northern Railway Surgeons' Association

The Association will hold its 1935 meeting at Many Glacier Hotel, Glacier Park, Montana, Monday and Tuesday, July 1 and 2. Dr. Douglas Corsan of Fernie, B. C., is president of the Association. The program for the meeting will be as follows:

Monday, July 1, 1935
9 o'Clock A. M.

The Emergency Treatment of Fractures
Moving Pictures made under the direction of
Dr. Charles L. Scudder, Massachusetts General Hospital, Boston, Massachusetts.

The Treatment of Spinal Cord Injuries
Dr. Loyal Davis, Professor of Surgery, Northwestern University Medical School, Chicago, Ill.
Fracture of the Surgical Neck of the Humerus
Dr. F. J. Savage, St. Paul, Minn.
The Treatment of Injuries of the Hand
Dr. Sumner L. Koch, Associate Professor of Surgery, Northwestern University Medical School, Chicago, Ill.
The Management of the Diabetic Railway Employe
Dr. A. E. Cardle, Director of the Diabetic Out-Patient Clinic, Minneapolis General Hospital, Minneapolis, Minn.
Malpractice Law Suits
Dr. B. J. Branton, Willmar, Minn.

Tuesday, July 2, 1935
9 o'Clock A. M.

Alleged Sacroiliac Strains
Dr. L. J. Stauffer, Priest River, Idaho.
Some Aspects of Major Infections of the Hand
Dr. Sumner L. Koch, Chicago, Ill.
Traumatic Detachment of the Retina
(With Motion Pictures)
Dr. Charles N. Spratt, Minneapolis, Minn.
Dislocations of the Knee Joint; Report of Two Cases
Dr. R. B. Richardson, Great Falls, Mont.
Septic Arthritis of the Knee Joint
Dr. John G. Cunningham, Spokane, Wash.
Trauma and the Malignant Testis
Dr. A. N. Collins, Duluth, Minn.

Redwood-Brown County

The annual meeting of the Redwood-Brown Medical Society was held at the Dakota House, New Ulm, Wednesday evening, May 15, 1935, with twenty-seven members of the society present.

A banquet at 6:45 p. m., including the Ladies' Auxiliary, was followed by an interesting program. Dr. William Peyton gave a talk on "Carcinoma of the Jaw and Antrum." Dr. R. W. Morse spoke on "Gastro-intestinal Diseases." F. Manley Brist gave a review of recent medical legislation.

The following officers were elected to serve the ensuing year: President, A. P. Goblirsch; vice president, C. A. Saffert; secretary-treasurer, Carl Fritsche. Dr. J. H. Vogel was elected delegate for 1936.

Rice County

A meeting of the Rice County Medical Society was held at Laird Hall, Carleton College, Northfield, Minnesota, April 26, under the sponsorship of Dr. Neil S. Dungay.

Dr. L. F. Hawkinson, Brainerd Clinic, gave an interesting talk on "Endocrinology."

St. Louis County

The regular monthly meeting of the St. Louis County Medical Society was held May 9 at Nopeming Sanatorium. The following program was arranged by the Sanatorium staff: 5:30 p. m., ward visits; 6:30, supper; 7:30, meeting. The scientific program included "Some End Results of Phrenic Neurectomy," Dr. J. G. Lamont, former superintendent of the North Dakota State Sanatorium; "Analysis of 2,000 Sedimentation Tests," Dr. G. A. Hedberg; "Animal Inoculation as an Aid to the Diagnosis and Treatment of Pulmonary Tuberculosis," Dr. David F. Loewen, post-graduate Resident, formerly of Trudeau Sanatorium; "Early Clinical Tuberculosis in Hospital and Sanatorium Employees," Dr. A. T. Laird.

Scott-Carver County

The Scott-Carver Medical Society meeting was held May 14 at Belle Plaine. Mr. M. F. Brist of St. Paul and D. W. Wilson, D.D.S., Chairman of the Legislative Committee of the Minnesota State Dental Association, spoke on Medical Economics. A meeting of the advisory committee took place before dinner served at 6:30.

Upper Mississippi Valley

On April 27, twenty-three Duluth doctors joined with the members of the Upper Mississippi Valley Society for an afternoon and evening meeting at Aitkin. Twenty-three other cities outside of Duluth were represented, and addresses were made, Dr. B. J. Branton of Willmar and Dr. Herman Johnson representing the State Medical Society. Dr. George Berdez and his associates from Duluth brought to the meeting a varied and interesting pathologic museum, and the cases represented were widely discussed by all present.

Washington County

At the meeting of the Washington County Medical Society May 4, a "Mantoux Test" for all children in the county was discussed and it was decided to perfect plans to carry out the testing. A report on immunization was given showing that children over twelve years of age were given the Schick test with reactors to be given two toxoid treatments three weeks apart, while children under twelve were given one full dose of toxoid (alum precipitate). Dr. Carnot Sherman of Oakes, N. D., formerly of Bayport, Minnesota, was a guest at the meeting. He spoke on conditions in North Dakota, expressing the belief that doctors should do their own charging and should be organized to act in self defense against organizations croaching on the rights of the doctor.

PROCEEDINGS *of the* MINNESOTA ACADEMY OF MEDICINE

Meeting of March 13, 1935

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, March 13, 1935. The President, Dr. A. R. Hall, in the Chair.

The meeting was called to order at 8 p. m. There were forty-six members and two guests present.

Minutes of the February meeting were read and approved.

Upon ballot, Dr. Thomas S. Roberts, of Minneapolis, was elected vice president of the Academy for 1935, in place of Dr. Butler, who had resigned.

The scientific program followed.

THE CONGENITAL CLEFTS OF THE FACE AND JAWS

Harry P. Ritchie, M.D.
Saint Paul

Dr. Ritchie's paper was illustrated with numerous lantern slides of cases, showing conditions both before and after operative procedures.

Discussion

Dr. Carl W. Waldron (Minneapolis) (by invitation): I certainly appreciate the opportunity to be here tonight to hear Dr. Ritchie. I have had the pleasure of working with him for several years, and more and more I am convinced that we are proceeding along fundamental lines. This is well illustrated by his method of approach to the subject of lip and palate repair. I feel that the surgical problems of the repair of these congenital defects are being thought out better by the surgeons of the country and that we are going to make much more progress in the next thirty or forty years than we have in the past. I think this progress will be based on the fundamental viewpoint that Dr. Ritchie has given us tonight. We see cases of frightful adult deformities due to lack of appreciation of the embryological and physiological considerations which Dr. Ritchie has just presented. Up to ten or fifteen years ago the problem was either approached from a cosmetic standpoint or too much attention was given to the bony foundation in so far as the maxilla was concerned. Many of the patients were operated upon with the best of intentions, the operation, however, being performed at much too early an age. We have still to contend with the old ideas of some surgeons that speech is well developed during the first year of life. These surgeons consequently thought that the soft palate must be sutured before nine months of age. This resulted of course in the sutures pulling away on account of undue tension, with a resulting gross deformity that could not be repaired surgically at a later date.

The muscle theory of the lip repair, as stressed by Dr. Ritchie for many years, is, I am sure, fundamental to the proper functioning of the lip. There have been certain problems with respect to the reconstruction of the floor of the nose that have made surgeons think out certain procedures. These primarily were of a purely plastic type, but we found that to make the part look right we should bring the muscles together correctly from the anatomic standpoint.

For several years I have used the modified Mirault procedure, though not quite as Dr. Blair has advocated. He elevates and turns skin flaps that include muscle. By undercutting, these skin flaps can be turned and still leave the large muscle bundle on either side for direct approximation and suture. In this procedure a small inverted V-shaped portion of skin from the short side of the lip is sewn down below the anterior margin but fundamentally it makes such a lip as Dr. Ritchie has described. I am convinced that with the thought and care we are now giving these cases, the surgical catastrophes we now see in adult cases will not be seen ten or fifteen years hence.

However, we still have plenty of problems. The matter of efficient dental occlusion and the satisfactory development of the facial profile are examples. After we try to get these taken care of, we still have the bugbear of imperfect speech to consider. I think the surgical lengthening of the palate and the improved functional closing of the nasopharynx is something that holds out a lot of promise. I agree with Dr. Ritchie, it is not a primary procedure.

It is a pleasure to have heard Dr. Ritchie tonight.

A CONTRIBUTION TO OUR UNDERSTANDING OF THE MECHANISM OF HYPERTENSIVE ENCEPHALOPATHY AND THEIR TREATMENT IN A CERTAIN GROUP OF THESE CASES

George Fahr, M.D.
Minneapolis

Discussion

Dr. J. F. Corbett (Minneapolis): I would like to thank Dr. Fahr for his most excellent paper and his treatment of the whole subject. This brings to mind two cases of mine where subtemporal decompressions were done. One of these was a man about 40 years old. There was no very marked degree of hypertension and, aside from that, the symptoms and signs were the same as those described by Dr. Fahr. My diagnosis, I must confess, was wrong. We thought we were dealing with brain tumor. I did a decompression. When I opened the dura and saw this flood of fluid coming, I discontinued any further operative procedure and awaited the result of the decompression. In a short time the other symptoms disappeared and the individual recovered to practically normal health. In this case there was even partial paralysis of one of the limbs. I watched that man for a long period of time. He remained in health, to my knowledge, for ten years. A short time ago I happened to see him in Northwestern Hospital where he is being treated for some kidney condition.

The other patient was a much younger individual who I also thought had brain tumor, but, in making the drill hole, I accidentally nicked the dura and had a flood of cerebrospinal fluid. That was four years ago. I saw that patient in the office the other day and there is no return of symptoms. That case did not have high blood pressure either.

This thing has been defined by Cushing as serous meningitis, and I placed these two cases under that heading. In two cases I have seen instances of "wet brain." One alcoholic had a wet brain with enormous amount of fluid. He got well but I lost track of him. The other case was a boy who sustained a severe fracture of the femur and was given ether for a long time. Soon after that he became paralyzed on one side. I was sure of the diagnosis of subdural hemorrhage. I went in but could not find anything outside of the dura. In that case I found an enormous amount of cerebrospinal fluid. Those four cases are cases of serous meningitis. Two remained practically well; one I don't know anything about; and the other died soon after the decompression.

Dr. George N. Ruhberg (Saint Paul): The studies of Fremont Smith and others have definitely shown that the spinal fluid is a transudate from the capillaries of the choroid plexus. The rate of formation is in direct relation to the venous pressure, which probably explains why, in some cases of hypertension, no increase in spinal fluid takes place, and in others it does. Any factor tending to increase venous pressure will, therefore, bring this about. I would ask, if Dr. Fahr, in his study of these cases, did not find this to be true?

Dr. John Brown (Saint Paul): I would like to ask Dr. Fahr for his differentiation between this and brain tumor.

Dr. Moses Barron (Minneapolis): One does not know what is going to be left for the internist, with the surgeons coming in and finding that they can operate now for heart disease, for hypertension, and similar conditions. Hypertensive encephalopathy is a very interesting condition. Unfortunately it is very complicated and its mechanism is little understood. Dr. Fahr stated that the operation on the first case was better than the second one, but he did not state why it was better. Thus encephalopathy occurs both with essential hypertension and in acute and chronic glomerulonephritis. In nephritis, one, of course, always has to consider the possibility of a true uremia. The use of operation for this condition will prove very limited in scope, since I believe that the symptoms are not always produced by an increase in the amount of the spinal fluid. Many cases come to autopsy in which there is no increase in the amount of spinal fluid, though there is an increase in the brain pressure, and thus, also, in the spinal fluid pressure. The second case reported gave only 7 c.c. of fluid, which illustrates this point.

The mechanism may be visualized somewhat like this: at first there is an increase in blood pressure, this causes an increase in pressure in the cerebral vessels. There is a poor vasomotor control there. The increased flow of blood in the capillaries under an increased pressure causes an escape of fluid into the brain tissues. It probably results in an intracellular as well as an intercellular edema. At autopsy the brain often appears under great pressure but the surface is dry. The symptoms therefore are the result of the ischemia resulting from the increased pressure.

I recall a case in point of a man who developed convulsions. I found him in bed with complete paralysis of his left arm and hand. As I started to get the sphygmomanometer and to place the cuff around his arm, he suddenly began to move his arm normally and the paralysis just as suddenly disappeared. While talking with him the paralysis again developed and, after a while, just as promptly disappeared. Through rest in bed and other measures the patient was comfortable for a month and then one morning he developed a true hemiplegia.

The ischemia in the brain, resulting from spasms in the blood vessels, plus the increased cerebral pressure may cause a weakening of the distal part of certain blood vessels so that when the blood starts flowing again the vessels, having become weakened, may rupture and the cerebral hemorrhage obtain.

It is my opinion, therefore, that only a few cases of this type can be subjected to this type of operation—those with an increased cerebral spinal fluid. My surgical friends, therefore, should not become over-sanguine about the operation on this type of case.

Dr. Fahr (in closing): It is very nice to get discussions from the surgeons because they are so very clear on certain things and stick to the point at issue. Dr. Corbett has given me considerable enlightenment on this problem. I liked to hear Dr. Corbett's description of this flood of subarachnoid fluid coming out—this "wet brain." You can't get some of the pathologists to call it a "wet brain," but this is a good way to get around the pathologist.

It was not an intensely high blood pressure that Dr. Corbett measured in the young girl who probably had an acute nephritis. The interesting thing about it is that they will go along for some time with a moderately high blood pressure and then up will go the blood pressure to higher values; they get blind, or vomiting begins, or convulsions start. Then if something like magnesium sulphate is given, that will bring the blood pressure down, these symptoms will disappear. I am not at all surprised that there was not a very high blood pressure at the time Dr. Corbett took it, but there probably was at the time the convulsions were present. In our cases when we got the blood pressure down, the symptoms disappeared. When the blood pressure went up, the symptoms returned. I venture that, at the time of the convulsions, you would have found the blood pressure around 200.

In reply to Dr. Ruhberg, quoting the man in Boston as saying that the "cerebrospinal pressure is proportionate to the venous pressure," I would state that if you raise the venous pressure you always raise the capillary pressure and the capillary pressure probably determines the rate of ultrafiltration and formation of cerebrospinal fluid. If vasomotor control of the lumen of the small arteries is lost, capillary pressure must rise in high blood pressure.

Dr. Brown wanted to know how we differentiate this from brain tumors. Well, that is a difficult thing. Bramwell fell down on the diagnosis in his case. They thought it was a brain abscess and it was what they called uremia. The only criterion I know of is the retinal arteriosclerosis found in cases of primary hypertension, or a knowledge of a previous history of high blood pressure, or urine and kidney function studies. The urine examination may help; kidney function studies may also help in the differential diagnosis.

In regard to Dr. Barron's discussion, I did not say that all cases of hypertensive encephalopathy are due to increased brain pressure. I said in a special group of cases, which I thought I carefully defined, this was probably the mechanism.

The meeting adjourned.

R. T. La Vake, M.D.
Secretary.

WOMAN'S AUXILIARY

President—Mrs. Martin Nordland, Minneapolis
Editor—Mrs. C. F. Ewing, Wheaton

Mower County

The Women's Auxiliary to the Mower County Medical Society held its regular monthly meeting March 25, 1935, at St. Olaf Hospital with seven members present. Mrs. Hertel, the president, appointed the following committees for the year: Program, Mrs. J. G. W. Havens and Mrs. L. Flanagan; Sewing, Mrs. A. W. Allen and Mrs. O. H. Hegge; Finance, Mrs. P. A. Robertson; Hygeia, Mrs. Paul Leck; and Social, Mrs. J. K. McKenna, Mrs. W. B. Grise and Mrs. A. W. Allen. After the business session, refreshments were served by Miss Rost. The remainder of the afternoon was spent in folding surgical dressings for the hospital.

The Auxiliary spent the afternoon of April 22 at the hospital, ten members being present. Following a business session light refreshments were served by the nurses.

A one o'clock luncheon was enjoyed by members of the Auxiliary May 27, at the Austin Country Club. Thirteen members and guests were seated at the table and were served an appetizing luncheon by the club cateress, Mrs. Knudson. During the business meeting, presided over by the president of the auxiliary, plans were made by members for the purchase of an oxygen tank for the hospital. The remainder of the afternoon was spent in folding surgical dressings for the hospital.

Olmsted-Houston-Fillmore-Dodge Counties

A dinner and scientific program marked the meeting May 7 of Olmsted-Houston-Fillmore-Dodge County Medical Society at the Rochester State Hospital. The meeting was held in conjunction with the Auxiliary society. Following the dinner, the Auxiliary elected the following officers: Mrs. G. B. Eusterman, Rochester, president; Mrs. C. E. Bigelow, Dodge Center, vice president; Mrs. B. F. Smith, Rochester, secretary-treasurer.

Mrs. Smith has transferred from the Kandiyohi-Swift-Meeker medical auxiliary.

Retiring officers are Mrs. F. P. Moersch, president; Mrs. Eusterman, vice president, and Mrs. F. C. Dolder of Eyota, secretary-treasurer.

For the program, Dr. H. C. Hinshaw presented an illustrated lecture on Beirut, Syria and Egypt.

* * *

Renville County

At the annual election of officers of the Renville County Medical Auxiliary at Olivia, Minnesota, May 7, the following officers were elected: Mrs. R. S. Madland, Fairfax, president; Mrs. R. C. Adams, Bird Island, vice president; Mrs. R. E. Billings, Franklin, secretary-treasurer.

* * *

Scott-Carver County

The Woman's Auxiliary to the Scott-Carver Medical Society held a luncheon meeting at Mudcura Sanitarium, Shakopee, Tuesday, May 7. Dr. J. A. Watson gave an excellent talk on "Socialization of Medicine." The State president, Mrs. Martin Nordland of Minneapolis, spoke on "The Purpose of the Auxiliary," and Mrs. James Blake of Hopkins, and Mrs. S. S. Hesselgrave of St. Paul, talked about the work being done by the organization. Dentists' wives of Scott and Carver Counties and officers of the League of Women Voters were guests of the Auxiliary. After the meeting, which was presided over by Mrs. H. E. Wunder, a get-acquainted hour was enjoyed at the home of Mrs. H. P. Fischer.

TRANSACTIONS *of the* MINNEAPOLIS SURGICAL SOCIETY

ANNUAL SYMPOSIUM ON CANCER

THURSDAY, APRIL 4, 1935

The President, DR. MARTIN NORDLAND, in the Chair

Dr. Martin Nordland, President: Before introducing the chairman in charge of the meeting tonight, I want to make a few remarks with reference to the purpose of the Minneapolis Surgical Society devoting one meeting each year to the subject of cancer.

It is the plan of the State Committee on Cancer to encourage every medical organization in the state to hold at least one meeting each year for the discussion of the problem of malignancy.

The object of this plan is to impress upon the medical practitioner and indirectly upon the public the fact that cancer is curable by the use of well known and established methods of treatment; to point out in a convincing manner that if all cases of cancer could be diagnosed early and treated promptly in their incipiency, the annual death rate from the disease, now recorded as 150,000 in the United States and Canada, would be reduced by 33 per cent or 50,000 per year. It has been stated that the average patient with carcinoma has delayed consultation with his physician seven months after suggestive symptoms have developed and that the physician has on the average delayed two months before beginning treatment. The object is, further, to convince the profession and the public that, even though cancer may be in the later stages, palliative measures may bring relief of distressing symptoms, and proper treatment arrest progress and frequently result in cure. Another purpose is, finally, to discourage the cancer phobia that now exists in the minds of the profession and public and establish that cancer is curable.

Dr. Bulkley, past president, has worked on this program, he has spent a good deal of time arranging it, and will conduct the meeting and call on the speakers in their turn. It is my pleasure now to turn the meeting over to Dr. Bulkley, Chairman for the evening.

Dr. Kenneth Bulkley, Chairman: Mr. President, members of the Surgical Society, and guests. I regret that the weather tonight is so inclement as it has had an effect of markedly reducing our attendance. May I take this opportunity first of stating that the Minneapolis Surgical Society meets on the first Thursday of each month during the winter in the lounge of the Hennepin County Medical Society and that these meetings are open to the medical profession. We try to start promptly at 8:00 p. m. and adjourn at 10:00 p. m. The courtesy of the floor is commonly extended to visitors who may wish to discuss any of the cases or papers presented.

It has been the custom of the Surgical Society, since it was founded, to have two standing committees, one of which is made responsible for an annual meeting on fractures and the other made responsible for an annual meeting on malignancy. Last year I happened to be the presiding officer and Dr. J. F. Corbett served in the position in which I find myself this evening. A year ago our meeting on malignancy was largely statistical and informative in character. We showed then quite conclusively that the vast majority of cases of malignancy in Minneapolis were not cared for by public institutions but were cared for by the general run of practitioners. Consequently, the meeting was devoted chiefly to the occurrence of cancer in private practice in Minneapolis and the available means of treatment.

This year we have somewhat revised our program and will present to you a series of individual papers on various aspects of the cancer problem. These papers have all been contributed by members of this Society and every member was given an opportunity to submit a title. From this list of titles your program committee selected the papers which will be presented tonight.

I shall now call on Dr. Baxter, our first speaker of the evening.

MELANOMA

S. H. Baxter, M.D.

The study of cancer reveals numerous instances illustrating the contradictory behavior in different individuals of tumors which, by all the tests now at our command, are almost exactly alike. This has been a frequent observation, and probably indicates that there is some difference in the individuals harboring these tumors which is too profound to be explained by the mere differences in the morphology of the tumors.

To illustrate this point, and to preface a brief discussion of melanomas, two cases are cited:

Case 1.—Mrs. Z., aged thirty-five, came to Hill Crest Hospital in October, 1920. About six months previously she had noticed a small growth in the skin of the left side of the neck. It seemed to be under the skin, there were no subjective symptoms, and the patient paid no attention to it until it began to grow. It was removed elsewhere in August, 1920, and was pronounced a "carcinoma which looked something like a melano-epithelioma." Several treatments were given with x-rays. About two months later a lymphatic gland in the left side of the neck began to enlarge. This gland was removed by operation and a radium capsule left in the wound. This tissue showed the effect of the x-ray treatments, but contained groups of carcinoma cells. Within a few weeks another lymph gland deep in the neck began to enlarge, and in March, 1921, a tumor the size of a small hen's egg was removed from beneath the left sternomastoid muscle. It was readily separated from the carotid sheath, but was intimately attached to the sterno-mastoid muscle, so that it was necessary to excise a part of the muscle with the tumor. A radium capsule was buried in the wound. The microscopic sections of this tumor showed a malignant melanoma with mitotic figures in some of the cells. There has been no recurrence and the patient is now living and well.

Case 2.—Mrs. R., aged thirty. In 1919 a mole was removed from the left side of the vulva between the labia. In May, 1920, the patient noticed a swelling in the left groin, which her physician regarded as an enlarged gland from an infected toe. In January, 1921, this gland was excised with a wide margin of the surrounding tissue and 90 mgm. of radium were left in the wound. Sections of the original tumor were then examined by different pathologists who gave varied opinions regarding its nature, Dr. Ewing expressing the opinion that it was definitely malignant. A generalized melanosis soon developed, and death ensued in a few months.

It is impossible, in the present state of our knowledge to explain why these two cases, of apparently equal degree of malignancy, should behave so differently. In this difference in behavior, possibly, lies the key to the solution of the cancer problem. "The variations in pigment offer a very delicate indication of the functional activity of the cells and a unique opportunity to trace the relation between functional activity and the growth capacity of the tumor cells." (Ewing)

Melanin is found very extensively in nature both in plants and in animals. It is autochthonous in the tissues in which it is found, being elaborated by the cells themselves through the action of an enzyme. It is not produced from blood pigment or hemoglobin or any other pigment brought to the cells by the circulating media, but its elaboration is a specific function of certain cells. In the vegetable kingdom a familiar example of the production of this pigment is found in the brown discoloration of the cut surface of an apple, which is the result of the action of an oxydase upon the chromogen in the cells. The juices of certain Japanese plants are changed by a similar process into the black dye that is used in lacquer.

A striking example among invertebrate animals is found in the ink-sac of the cuttle-fish. The black pigment produced by some fungi, e.g., the inky-cap mushroom, is similar in origin and in composition to that produced in melanotic tumors. In the horse a condition is found which has not been observed in man, that of a diffuse melanosis, and, strange to say, it affects only white or grey horses, not dark-colored ones. The pigment in the skin of the chameleon is controlled in a most extraordinary manner, to enable the animal to change its color to lighter or darker shades according to the color of its surroundings. The pigment granules are found in the branched cells of the corium of the skin. These cells are under nervous control and when the granules are scattered throughout the cells, the skin is dark; when they are concentrated in the center of the cell, the skin is light-colored. This nervous mechanism is probably not volitional, but sympathetic or automatic, and is set in motion by various external stimuli and possibly by the action of light on the retina.

Melanin, therefore, and melanin-forming cells are found normally throughout all living tissues, both vegetable and animal, and the absence of it, as in albinism, may constitute an abnormality. All degrees of variation in pigmentation are found in normal tissues under various conditions. The bathing beaches in summer offer striking examples of the effect of sunlight in stimulating the deposit of melanin in the skin. There is a physiologic increase in pigmentation in pregnant women—chloasma uterinum—which is most marked in the areolæ of the breasts, but affects other areas of the skin also. This effect is most marked in brunettes. Some cases of exophthalmic goiter show a similar increase in the pigmentation of the skin.

In the fetus of both dark-skinned and white-skinned races, the basal cells of the Malpighiian layer contain pigment. In the white races, most of these cells become depigmented by disuse, but some cells remain as potential melanoblasts which manifest themselves in the form of freckles or bronzing of the skin under the influence of actinic light rays.

Melanin is assumed to be preceded by a colorless substance, melanogen or chromogen, a protein body which is closely related to tyrosin and which, by the action of an enzyme in the adrenal gland is converted into adrenalin. This melanogen, or mother-substance, may also be converted into melanin or brown pigment by the action of the specific ferment or oxydase which is produced by the melanoblasts in the Malpighiian layer of the skin. When there is absence of the enzyme in the melanoblast, then no melanin is formed from the colorless mother-substance, and we have the condition of albinism. On the other hand, in Addison's disease it is presumed that the disease of the adrenal prevents the normal conversion of the mother-substance or melanogen into adrenalin, so that there is an excess of this substance in the circulation and it is converted into melanin by the specific ferment in the melanoblasts of the skin. Under conditions of disease, the production of melanin is enormously increased. It has been estimated that there is only about one gram of melanin in the entire skin of a negro, but three hundred grams have been extracted from a melanotic tumor of the liver.

The consideration of the origin and structure of melanomas would take us into a field of speculation which is beyond the scope of this discussion. Whether melano-carcinoma, melano-sarcoma, melano-endothelioma, etc., have a common origin in the germinal layer of the skin, or whether they have varied origins is a question on which there is much disagreement, and for our present purpose, is largely of academic interest. Ewing sums the matter up in these words: "Theoretical considerations favor the origin of the melanomas from the mesoblastic chromatophore, and histological considerations favor the origin from epithelial cells which have taken on pigmentary functions: The established tumors are sarcomatous or carcinomatous in structure or both."

From the normal, diffuse deposits of melanin, we now pass to a consideration of the localized concentrations of pigment which merge, by gradual degrees from quiescent moles which are so common as almost to be regarded as normal, into the group of highly malignant melanomas. Pigmented moles are very common malformations of the skin. The characteristic feature of the pigmented mole is the presence underneath the epidermis of nests of cells of fairly large size, polygonal in shape and containing brown pigment. They are congenial in children and represent areas of faulty development of the skin. Some authors think that they are congenital in adults also. The specific cells are peculiar not only to the moles, but to the skin generally; to the choroid coat of the eye, where they are most abundant; to the arachnoid covering of the brain and spinal cord, and to some extent to mucous membranes.

Adami questions whether pigmented moles should be regarded as definite tumors because, though to the naked eye they appear sharply defined, under the microscope their connective tissue stroma merges imperceptibly into the surrounding tissue. He regards them as an excessive development of a constituent of normal skin which, for some reason, has taken on the active elaboration of pigment.

Associated with pigmented nevi and melanomas, by a curious and unexplained relationship, are groups of tumors made up of cells originating in nervous tissue. A plexiform neuroma may be found underlying a melanoma. Molluscum fibrosum and localized neuromata are related growths and frequently contain pigmented areas. Von Recklinghausen's disease is the most remarkable example of this group of tumors. One reported case of this disease presented a "veritable eruption" of tumors all over the body following an injury to a single tumor over the shoulder-blade. The tumors of Von Recklinghausen's disease frequently contain melanin. A specimen of a metastatic melanoma in the liver was made up of triangular cells with large nuclei "resembling cells of the central nervous system."

Further suggestion of the association of nevi with the nervous system is found in the so-called "systematized nevi" which seem to follow the facial clefts or Voigt's lines, or the distribution of the peripheral nerves. In a case which came under our observation recently, in which there were almost universal metastases from a malignant melanoma, there was a chain of secondary tumors, one tumor over each rib.

"It cannot be definitely stated what kinds of moles are likely to become malignant," according to E. T. Bell. Nevertheless, it seems worth while to try to make some distinctions between different kinds of moles. Whether one should draw a distinction between congenital moles and those first appearing in adult life is open to question, because it is quite probable that the malformation in the skin responsible for the later development of the mole was present from birth. Probably 90 per cent of people have moles in the skin and since malignant melanomas are not numerous, it would appear that the incidence of these tumors is not disproportionately large, compared with the incidence of other forms of malignancy. Of malignant melanomas of the skin, about 50 per cent develop from moles that have been present from birth, the rest from moles that first appear in adult life. Primary melanomas of mucous membrane are very rare, the recorded cases having been of tumors of the hard palate. One is reminded here of the black pigmentation of the roof of the mouth in dogs. The commonest site or origin of melanoma is the uveal tract. Melanoma of the choroid is ten times more frequent than melanoma of the ciliary body, and melanoma of the iris is very rare. Melanomas of the nail-fold of the toes, and melanomas originating in the skin of the feet after some injury deserve mention. They are highly malignant and free excision, with radium treatment, offers the best chance of cure.

Of the cutaneous nevi, two classes may be distinguished: (a) the "soft nevi," which contain the characteristic nevus cells, have been regarded as arising from the basal cells of the rete Malpighii, whose function is potentially melanoblastic; (b) "hard nevi" have been regarded as arising from the other layers of the rete and are pigmented only secondarily; their cells have already begun to differentiate along the line that will eventually lead to squamous epithelium; these hard nevi are essentially papillomata with the addition of pigment and when they become malignant they form squamous epitheliomata. It is rare for the acanthotic, hard nevi to become malignant; the corium is not invaded by strands of epithelial cells. But when malignancy does commence, then individual cells and strands of cells break away from the germinal layer, just as in true squamous epithelioma. In the study of melanoma by Dawson, only one out of thirty-seven such pigmented nevi, many of which were large and ulcerated, showed any indication of malignancy.

A melanoma which has become malignant and is increasing in size will often show an advancing zone of vascularity and soon form a hemorrhagic nodule. There will be an increase of pigmentation which merges gradually into the normal skin. The tracing of the transition from a benign to a malignant melanoma shows that the change is essentially one of an infiltrating growth which spreads by direct extension, by lymphatic channels and by blood vessels. The original tumor does not often attain any great size, but the secondary growths may be exceedingly numerous, involving all the viscera. The liver is the favorite site for large secondary growths. The muscles usually show little involvement. Histologically, increased cytoplasm, and hyperchromatic nuclei and mitoses are evidences of malignancy, but the amount of pigment present is no guide to the degree of malignancy.

The spleen is almost never involved by metastases. The reason for this is not apparent. Research is now being conducted in an attempt to explain this immunity of the spleen from these tumors. If this explanation can be found, it may throw some light on the problem of the genesis of malignant growths.

From the standpoint of prognosis, the two cases cited in this paper illustrate one of the conspicuous differences in the behavior of these tumors. In one case, metastasis was into the regional lymph glands and persistent attack resulted in a cure. In the other case the metastases were universally disseminated through the blood stream, and the prognosis was hopeless.

Since we have at the present time no sure way of distinguishing between a mole which will remain benign and one which will become malignant, the wise course, theoretically, would be either not to disturb a mole by any kind of treatment, or to treat it as though it was known to be malignant. As has been stated above, the acanthotic, or hard nevi, are papillomata rather than true melanotic nevi, and it is probably moles of this class that have been successfully treated by the electric needle, fulguration or electro-coagulation, without recurrences or metastases. But even these moles occasionally become malignant, and the indiscriminate use of the electric needle on moles of any kind is to be condemned. Amadon reported twenty-seven cases treated by electro-coagulation, all of which had local recurrences and metastases to lymph glands within a few months. This was apparently caused by the forcing of tumor cells or of melanin into the blood and lymph channels by pressure of gas or steam generated in the tissues by the electric current. If a pigmented nevus is to be treated at all, it should be excised with a liberal margin of healthy tissue. Then, if the microscopic examination of the tumor shows that it is malignant, the regional lymph glands should be removed and a radium capsule left in the wound. Even if the nevus, after its removal, is found to be of doubtful malignancy, prophylactic irradiation of the site of the nevus and of the regional lymphatic glands may prevent a recurrence or metastasis. Recurrences, although they may give a very discouraging outlook, will, when persistently followed up, sometimes result in the unexpected cures, as in Case I, reported herewith.

Finally, let us not forget that many patients afflicted with malignant disease cannot be cured by any means that we now possess. Therefore, a cure is not the sole object of treatment. A patient with an incurable disease is in more dire need of treatment than one who is on the high road to recovery. He needs all the physical aids that can be brought for his relief and assistance. He needs moral support. He needs the assurance that he will not be abandoned because his case is hopeless, and that his physician has not lost interest in him because a cure cannot be effected.

MALIGNANT TUMORS OF THE THYROID GLAND

Martin Nordland, M.D.

Malignant tumors of the thyroid gland are not extremely rare when one considers the numerous statistical studies showing from 1 to 3 per cent of all nodular growths in this gland to be carcinomata. However, it is only rarely that this type of malignancy is diagnosed preoperatively since only a small single area in a benign nodule is involved early in the disease. On the contrary, when there is a hard fixed tumor, hoarseness, dyspnea, and immovable vocal cords, the nature of the condition is obvious. By this time metastases are likely to be extensive; in fact they often occur so early in the disease that their origin may be obscured.

Carcinoma

Considerable confusion exists concerning the histological classification of thyroid cancer. The classification should be simple to be of value in the clinical management. Pemberton, in his classification, divides malignancy of the thyroid into three clinical groups. This classification is simple and of considerable help in the clinical management. He divides carcinoma of the thyroid into: (1) papillary adenocarcinoma; (2) malignant adenomata; and (3) diffuse growths of the scirrhous type including a few of the spindle-cell variety. The microscopic diagnosis of malignancy in the thyroid is not always easy even for the trained pathologist since there is a great diversity of histologic features as well as a marked similarity to benign conditions. However, actual invasion by the neoplastic cells of the blood vessels, if found, is a reliable criterion upon which to base a diagnosis of malignancy.

It is not surprising to note that metastasis takes place early in this disease when one considers the rich blood supply of the gland, its proximity to the lymphatics and large blood vessels. The incidence and extent of metastasis varies greatly with the type of lesion and the degree of malignancy, it being noteworthy that the papillary type of growth frequently shows late metastasis and then only to the regional nodes. Highly malignant lesions, such as spindle-cell varieties, are of rapid growth, produce early distant metastasis and usually prove to be speedily fatal. Therefore, in the treatment of this condition, both the factors of the extent of the growth and the histological structure of the lesion must be kept in mind.

The so-called classical symptoms of thyroid malignancy are those of the end stages of the disease and are not always characteristic. These patients are usually in the fifth and sixth decades of life and in most of the cases there is a history of pre-existing nodule or unilateral enlargement of the thyroid gland. A nodule such as this may suddenly enlarge, it usually becomes harder, more nodular and soon symptoms of tracheal compression or laryngeal involvement are present. Mediastinal or pulmonary extension may produce dyspnea but pain is frequently a late phenomenon. Pressure on the recurrent laryngeal nerve or direct extension of the growth into the trachea results in hoarseness and cough, and if the esophagus is encroached upon dysphagia is present. Hoarseness is a significant symptom, since it usually means that the tumor has broken through the capsule and that the nerve is actually invaded or pressed upon. These symptoms are rarely present until the condition is relatively hopeless.

In the early stages of thyroid malignancy there are o symptoms that are positive and diagnostic. Sugestive symptoms and findings, however, are slow rowth of a pre-existing adenoma, increasing firmness f the tumor, pressure sensation and lack of freedom f movement on palpation.

Differential Diagnosis

Clinically we must differentiate thyroid tumors from iedel's type of chronic thyroiditis, tuberculosis, and udden hemorrhage into an adenoma. In general, in on-malignant tumors of the thyroid, involvement of he recurrent laryngeal nerve is very rare. The quesion of the possibility of carcinomatous lesions of the hyroid producing hyperthyroidism has not been comletely settled, although Pemberton states that this ondition practically never takes place. When there is nlargement of the gland along with a condition of yperthyroidism, the presence of malignancy is very are, although in Pemberton's series, 87 per cent of he cases of malignancy were associated with benign odules elsewhere in the gland. It is these benign denomata which are most likely to cause hyperthyoidism.

In the differential diagnosis there are several condiions to be considered. The most noteworthy, alhough rare, is the so-called Riedel's struma or woody hyroiditis. The etiology of this disease has been varously ascribed to tuberculosis, lues, and other types of hronic inflammation, but no convincing evidence of any of these factors has been presented. In this disease the gland is so hard that its consistence has been described as stony or like that of iron. However, its contour is smooth and rounded, the normal shape of the gland is retained, there is no hoarseness, and there is little or no fixation of the gland to the surrounding structures. There is no evidence of extension to the regional nodes and distant organs. Malignant tumors are usually nodular and unilateral, they frequently metastasize early and soon involve the recurrent laryngeal nerves so that hoarseness and dyspnea are relatively common symptoms. The indications for surgical removal of the gland affected by woody thyroiditis consist mainly in pressure symptoms such as dyspnea and dysphagia. When surgery is undertaken for this disease it should, if possible, be limited to partial resection of the gland, since, as a rule, very little functioning gland tissue is left and myxedema may result. Late in the disease myxedema is common, but this may be controlled satisfactorily by the oral administration of thyroid gland extract.

Tuberculosis of the gland, while extremely rare and of little clinical importance, is occasionally confused with malignancy. It has been noted that tuberculosis occurs frequently in association with increased functional activity of the gland in contradistinction to malignancy which rarely invades a gland already involved with hyperthyroidism. The disease is most frequently a part of a generalized tuberculosis or secondary to an acid-fast infection elsewhere in the body; the result may either be a frank abscess formation or a chronically inflamed fibrotic mass. Microscopically the latter type shows tubercles intra- or inter-follicular. The surgical treatment is incision of the abscess or lobectomy depending upon the condition encountered. The prognosis is excellent, according to Rankin and Graham. From their studies they could not conclusively determine whether the hypertrophic gland is rendered more susceptible to invasion by the bacillus of tuberculosis, or whether infection stimulates the parenchyma to abnormal activity resulting in hyperthyroidism.

Hemorrhage into a thyroid adenoma may produce a most confusing picture. The history, however, in most cases gives the correct diagnosis. The patients may or may not have previously noted a goiter. Suddenly, as a rule, following exertion, the adenoma of the thyroid increases definitely in size. This swelling occurs in the matter of a few hours or a day and is associated with marked local tenderness and at times with symptoms of choking and pressure in the neck. The tumor, following hemorrhage, tends to subside slowly over a period of days or a few weeks. Such a history differentiates at once the firm, hard swelling which is present on examination in these cases as due to a recent hemorrhage and not to malignant degeneration. Malignant degeneration of an adenoma, though it may be rapid, is never a condition developing within a matter of hours or one or two days.

Sarcoma

Almost every conceivable type of sarcoma of the thyroid has been described, including the fibro-, chondro-, osteo-, lympho-, hemangio-sarcomata, and also the round, spindle and mixed cell variety. Metastatic sarcoma involving the thyroid gland has occurred, but it is very rare.

Grossly, thyroid sarcomata are usually unilateral or median tumors; rarely do they produce a diffuse involvement of the gland. The rapidity of growth of these lesions is extremely variable, depending upon their degree of malignancy. The more differentiated types, such as the fibrosarcomata, are of slow growth, while the more embryonic types, especially the round-cell variety, enlarge rapidly, metastasize early and widely, and death commonly takes place relatively soon after the onset of symptoms. Hemorrhages and necrosis are common in the latter type of case, and in some cases of this nature enlargement has been so rapid that the condition has simulated a phlegmon of the neck.

As the malignant tumor grows it invades adjacent tissues, the veins of the neck, the trachea, larynx, muscles, arteries, nerves and skin. The original contour of the gland soon becomes completely destroyed from extension of the growth. Symptoms of compression of the esophagus, of the trachea, and especially of the recurrent laryngeal nerve, early giving rise to hoarseness, are common. Death commonly occurs from respiratory difficulty due to edema and compression of the glottis.

Metastasis may be late, but usually it is early. The route by which it occurs is primarily through the blood stream, less frequently by way of the lymphatics. Invasion of the thyroid veins within the goiter itself has been described along with the release of emboli directly into these veins, metastatic growths reaching primarily the lungs, and secondarily the skeletal system, liver, kidneys, and intestines. Frequently it is the case that metastasis dominates the picture while the primary focus remains relatively latent. Pulmonary metastasis often leads to erosion and perforation of blood vessels resulting in hemorrhages, pleural effusions, and so forth. These conditions may be confused with tuberculosis.

Sarcoma of the thyroid may occur in young individuals the same as it does in other locations of the body. According to most investigators, sarcoma, and likewise carcinoma, arises in about 90 per cent of cases in a pre-existing nodular goiter, usually in an individual in the fifth and sixth decades. As long as the growth remains inside the capsule no symptoms are produced, so the exact time at which the malignancy begins cannot be determined. Pre-malignant conditions likewise are difficult in evaluation since they may exist for a long period and the exact time of their metamorphosis into malignant lesions cannot be determined. The goitrous enlargement is the only symptom of which the patient is aware.

Thyroid malignancy is suspected, then, because of a firm, hard discrete type of tumor in the thyroid gland, because of recent growth, either slow or rapid, and because of secondary evidences of pressure such as difficulty in swallowing and breathing, and hoarseness. Thyroid malignancy soon leaves the normal contour of the thyroid gland to grow in an irregular and unrestrained manner and to become adherent to adjacent structures. In a few cases, the presence of large lymph nodes near the goiter is suggestive of the presence of malignancy. In rare cases bone metastases may be the first indication of the presence of malignancy in an apparently benign adenoma.

Treatment

In many instances operations are undertaken for a supposedly benign adenomatous goiter only to find that by immediate microscopic examination or by recurrence of the lesion at a later date, that neoplastic change had already taken place. Needless to say it is in these cases that are not diagnosed clinically that the best results may be expected. This fact, however, is dependent upon the pathologist making a thorough search and reporting the presence of malignancy at the time of operation. Extension of the growth through the thyroid capsule, as evidenced by fixation of the gland, lymph node involvement or metastasis, usually precludes the possibility of cure of resection of the mass. When metastasis occurs, the incidence is in the following order: chest, bones, pelvis, clavicle, sternum, ribs, skull, knee, spine and abdomen.

In the prophylactic removal of adenomata of the thyroid gland lies the greatest hope of cure of malignant lesions, since about 90 per cent of all these neoplasms occur in pre-existing nodules. After malignancy has been diagnosed, the treatment of choice is radical resection, and if this is impossible irradiation alone or combined with surgical removal is strongly indicated.

In early cases in which the carcinoma is confirmed within the capsule, removal of all of the growth without rupture of the capsule is sufficient. If there is no definite encapsulation, total removal of the affected lobe must be done. In still later cases, even though the growth is fixed, complete extirpation with subsequent irradiation should be done. At exploration, if the growth is found to be inoperable, radium needles may be buried in the tumor. These are attached to silk threads so that the surgical wound may be closed and the needles removed aseptically after the specified time has elapsed. In addition, a large rubber drainage tube should be left in the wound so that radium on a lead stem may be inserted into the depths during convalescence. In inoperable cases, supplementary treatment is usually necessary, consisting of checker-boarding the region of the thyroid gland and applying radium in a mild erythema dose. High voltage roentgen ray treatment may also be used as a supplementary measure. By this method of treatment Pemberton and Fricke have effected a goodly percentage of cures.

Summary

In summary, it may be stated that surgery alone in this condition is usually not justifiable, even if the malignant lesion is entirely removed, although in many instances radical resection has proved to be a satisfactory procedure. The latter is especially true of the papillary adenocarcinomata which grow slowly, and tend to remain encapsulated for a long time. In the more malignant types, radiotherapy certainly offers additional protection against the extension of the disease. Tracheotomy is frequently nesessary, especially in the later stages of the disease, as a palliative measure.

The prognosis of carcinoma of the thyroid has been shown by Pemberton and Fricke and others to be as good as that of similar lesions of any other organ with the exception of the lip and the skin. Of 323 cases treated by them with a combination of surgery and irradiation, five-year cures were effected in 43.9 per cent. Twenty per cent of these individuals lived ten years.

Discussion

Dr. Charles R. Drake (by invitation): This subject is perhaps best discussed from the standpoint of: (1) occurrence and pathology; and (2) treatment.

1. Thyroid malignancy is not of frequent occurrence. In various clinics and statistics the figures of occurrence vary from .5 to 2 per cent of all thyroid diseases considered. In the past twelve years at the Swedish Hospital (although the record is somewhat incomplete) out of 1,980 surgical and medical cases treated, at least ten malignancies were definitely found, either clinically or microscopically. I presume that all thyroids with definite nodules are potential malignancies, but all nodules are of necessity not sectioned because many thyroids have a large number of nodules or areas that

might show malignancy but are overlooked in sectioning.

The pathology of malignancy of the thyroid is to say the least rather obscure. The microscopic picture is often not clear at all and is the subject of considerable controversy; especially is this true of the exact differential diagnosis between sarcoma and carcinoma. Ewing says: "Notwithstanding the wide acceptance of numerous reported cases of sarcoma of the thyroid, there is a strong reason for believing that the great majority of these tumors are of epithelial origin. It is clear that the diagnosis of sarcoma has usually been accepted on the most superficial resemblance to a mesoblastic tumor, and without any effort to critically interpret the structure and origin. Hence many authors have recognized the uncertain standing of thyroid sarcoma, but dismissed the matter by stating that there is no sharp dividing line between carcinoma and sarcoma. The close resemblance of the general etiology, clinical course, and gross anatomy of the two conditions fully bears out this conclusion. There remain only histological distinctions, but when these are examined in detail they fail to establish the frequent occurrence of malignant mesoblastic tumors of the thyroid."

However, the sarcomas, if they are so diagnosed, are very rare. As such they would participate in the various classifications of sarcoma, such as fibro, spindle, and round cell sarcomas. The real difficulty here lies in the difficulty of the differentiation between the epithelial elements and the connective tissue elements. I should prefer to speak of them all as malignant tumors rather than with specific differentiations. The same difficulty occasionally occurs in other locations of the body, especially such as sarcomas or carcinomas of the ovaries or testicles. Apparently those parts of our bodies which possess the more nearly embryonal types of cells give us the most difficulties in diagnosis.

Malignancies of the thyroid usually occur in those who have a goiter history, especially of the adenoma type. The adeno-carcinomas are usually lobular, with soft peripheries and hardened centers. They are very vascular. The rate of growth is usually slow, but progressive. The type of cell structure is either cubical or cylindrical and may be diffuse or alveolar. Papillary forms are a sub group of the adeno-carcinoma type. The capsule is at first intact but later infiltrated. Transition from adult type cells to embryonal types are frequent. Separation between adeno-carcinoma and other forms of carcinoma is very imperfect. The carcinoma may be alveolar, scirrhous, or massive cell type resembling sarcoma—"carcinoma-sarcoma." Absence of colloid is an important differential point. All are very vascular. There is also the question of metastases of benign thyroid tissue or whether these areas are embryonic rests of thyroid tissue.

The histogenesis of these tumors is both embryonal and adult in character. The squamous cell type comes from the thyroglossal duct.

The carcinomas, so-called, being of the epithelial type, when clearly defined, take on the form of: (1) scirrhous; (2) papillary; and (3) adeno-carcinoma of malignant adenoma. The papillary type is grouped under adeno-carcinoma. The point of differentiation between the malignant adenoma, adeno-carcinoma and carcinoma is also very difficult at times and the question arises as to whether in some of these tumors one is dealing with a malignancy at all. Like all malignancies, these tumors may be slow or rapid in growth, hard or soft inconsistency, remaining local or rapidly metastasizing in character. Metastases occur most frequently in the following locations in the following order: lungs, bones, liver, kidney, pleura, brain, regional glands. Bone involvement by metastases occurs most frequently in the following order: skull, sternum, spine, ribs, humerus, femur, and pelvis. Those metastases which occur in the lungs and bones, of course, are the most frequent and most readily diagnosed by the x-ray. The difficulties of microscopic diagnosis are well demonstrated by the microscopic slides which Dr. Nordland has shown you.

The question of metastases, I believe, is the most important of all considerations in the treatment of malignant cases. When a malignancy remains local a cure can almost always be obtained provided the malignancy is not associated with or primary in a vital organ. In these cases surgery, cautery, radium and x-ray become efficient agents in the destruction of the malignant process. However, when the malignancy is located in inaccessible localities the treatment becomes of no avail or at best palliative with radiation the method of choice. Care must be exercised in radiation therapy because I sometimes think that excessive radiation therapy is dangerous to the metabolic processes of normal structures, and often patients succumb to toxic products, either of the malignancy or of the radiation. Be that as it may, the question of metastases is of the utmost importance. Experience has told me that metastases may occur *early* or *late* in most varieties of malignancies. Usually the early metastases are not discernible, hence one general principle of treatment is axiomatic —all malignancies should be treated *fully* by the best accepted methods or combination of methods with the expectation of a cure, because when we least expect a cure we sometimes obtain one.

2. *Treatment.*—All thyroids with nodules should be removed surgically, at which time microscopic diagnosis should be made. Potential malignancies may be found in all nodular thyroids, hence surgical removal is prophylactic as well as diagnostic. If a diagnosis of malignancy is made, post-operative radiation, either by x-ray or by radium pack, should be carried out. In clinically inoperative cases, radiation should be instituted locally by the use of radium packs, radium implants and x-ray, and if metastatic, by x-ray. It is not my purpose to give technic of radiation therapy, but to give emphasis to intensive and sufficient treatment. These tumors are considered quite radio-sensitive. Craver of the Memorial Hospital in New York reported of thirty-three cases so treated, nineteen died, four not traced, and ten living, with three showing marked improvement, at the end of several years. Other clinics give similar reports. If a clinical diagnosis can be made, operative procedure should not be undertaken unless the tumor is circumscribed and movable. If no surgical treatment is indicated, intensive radiation by radium and

x-ray should be instituted. Those that are far advanced with complications to the larynx, and with metastases to the lungs are practically hopeless.

At the Swedish Hospital one patient of Dr. Nordin's is well after three years following treatment by x-ray alone. Others treated by x-ray regressed, but later died of metastases. I recall one severe case of a patient treated by radium packs, who obtained relief and recession for a period, only to die later of recurrence.

I wish to report at this time a case that seems remarkable in many ways, first because of the undoubted malignancy, second, because of the lack of metastases, and third, the method of treatment by radium alone. This was the case of a woman, aged forty-five, referred to me in July, 1922. There had been a history of enlarged thyroid for some time in this case. While seeing another member of the family professionally, the physician in charge had his attention called to this patient with a large nodule in the thyroid region which resembled an abscess nearly ready to open. The patient was sent to a hospital where the lesion was opened but a severe hemorrhage occurred because of the vascularity of the region. The hemorrhage was controlled. The patient went home and later left the state. This was in January, 1922. The condition never healed and a large discharging sinus developed. At one time a very severe hemorrhage occurred after this while she was out of the state. She later returned and I saw her first about July 5, 1922. At that time in the hospital we curetted out of the sinus some small masses of soft mushy material for microscopic diagnosis. The sections showed "entire structure to be made up of glandlike acini resembling thyroid growth without colloid material. Occasional mitotic figures are found. Entire structure is made up of this material. There is some inflammatory reaction in certain portions. Diagnosis: Adenocarcinoma.

The case looked like a hopeless one. The patient was in a very poor condition generally. However, the local lesion was treated by the insertion of radium needles on July 11, six in number, for eight hours (600 mgh.). Again on July 20 four needles were used, four and one-half hours, and a radium pack of 100 mgm. was applied over the entire area of the thyroid, 2,100 mgh. On August 20 a second pack treatment of 2,000 mgh. was given. On September 29, a third pack of 1,200 mgh. was given. On January 8, 1923, a fourth pack treatment of 1,000 mgh. was given. A note on the chart made at this time (1-8-23) says: "Very marked improvement and tumor almost gone. Sinus healed." A note on the chart made March 3, 1923, says: "Small gland-like nodules." A treatment was given with radium pack on this date. No further treatment was given. This woman is still living and well after thirteen years.

In conclusion I would make these observations:

1. There is considerable difficulty of absolute diagnosis, both clinically and microscopically, of thyroid malignancy.

2. Surgical removal of all thyroids with nodules is recommended, especially if there is a tendency to continued growth.

3. Thorough radiation should be carried out, either by x-ray, radium, or both, when a diagnosis is made clinically or microscopically.

4. The continued treatment by radiation results in a fair number of cures—depending largely upon the element of metastases or upon the microscopic picture.

MALIGNANT TUMORS OF THE URINARY TRACT

Theodore H. Sweetser, M.D.

Although there has been a gradual improvement in the result of treatment of cancer of the urinary tract during the past twenty or thirty years, we still find that many, perhaps a large majority, of such cancers are incurable when the diagnosis is finally made. Pleas for earlier diagnosis are still needed. To some extent the delay is unavoidable because the cancer at first may be symptomless. Some of the delay may be charged to the patient because he may disregard a painless hematuria or may take patent medicine for an unexplained bladder irritability. But some of the delay may be charged to the physician who treats a patient with hematuria, bladder irritability or kidney pain without a proper explanation of the cause of the trouble.

Hematuria always demands an adequate explanation, and a complete explanation nearly always necessitates a complete urologic examination. Hematuria does not always come from a new growth; it has many possible causes, including a few, such as acute gonorrheal urethritis, in which cystoscopy is contraindicated. But the three most common causes—stone, tuberculosis, and tumor—all demand thorough investigation and treatment. An unstudied hematuria due to cancer may cease with rest in bed, and the cancer may be incurrable when bleeding next occurs.

Barringer,[1] in reporting cases of bladder tumor, says, that "in most patients there was a lapse of over a year before they sought hospital treatment. The large majority of these cases had sought medical advice much earlier in their disease." One patient under my care at this time had intermittent hematuria for over a year before he consulted a physician complaining of frequent difficult unrination, loss of weight, and anemia; he had a large papillary carcinoma of the bladder (Figs. 3 and 4). Another patient, in whom we found an adenocarcinoma of the kidney, had consulted several physicians for hematuria and lumbar pain during the preceding three years. They had given various medicines and treatments without any adequate attempt at diagnosis. On the other hand, in still another patient, I found blood coming from the right ureter but found no abnormality in pyelograms or ureterograms; as we were considering exploration of his right kidney, some days later, he had a sudden pain in the left loin and cystoscopy demonstrated bloody urine coming from the left kidney only. The patient had no operation but ceased bleeding after administration of ovarian substance and is still living, with no sign of tumor after several years.

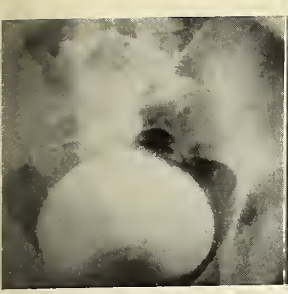


Fig. 1

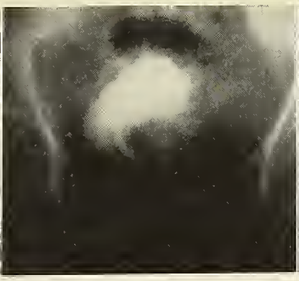


Fig. 2

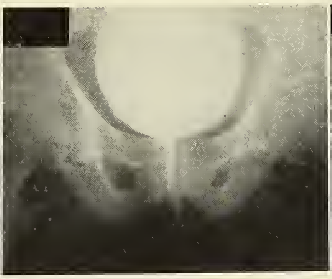


Fig. 3

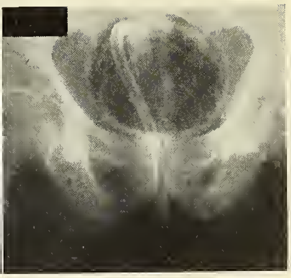


Fig. 4

Fig. 1. Cystogram in a case of benign prostatic hypertrophy. Note the smooth filling defect without distortion of the bladder wall.

Fig. 2. Extensive carcinoma of the bladder involving the bladder outlet, trigone and left wall. Note the irregularity of the filling defect and the distortion of the bladder wall. Also on the left side note, indistinctly, a large diverticulum, the outlet of which was practically closed by tumor tissue.

Fig. 3. Cystogram with skiodan in a patient with a very large papillary carcinoma of the bladder nearly filling the bladder. The narrow margin of increased density at the periphery on the right side is about the only place where the tumor does not reach the bladder wall.

Fig. 4. Cystogram in the same case after drainage of the skiodan and injection of air. The coating of skiodan on the surface of the tumor can be seen at its margins with a zone of air-filled bladder beyond; the curve of the catheter in the bladder is an added indication of the size of the tumor. This tumor is attached to the bladder wall in an area comprising the trigone, neighboring parts of the left bladder wall and the bladder outlet.

We will accomplish much if we will be able to make the profession and the public realize that hematuria demands adequate explanation, even though that may require a complete urologic examination. Such a complete urologic examination should include a search of the urethra, bladder, ureters, and kidneys, by urethroscopy, cystoscopy, cystography in many cases, ureteral catheterization, renal function tests, cytologic and cultural examination of the urines from the kidneys, ureterography and pyelography. There are many causes of hematuria and sometimes two causes in one patient. One occasionally hears of bleeding from an enlarged prostate concomitant with bleeding from a tumor of the bladder or kidney. I shall never forget one case in which I found prostatic bleeding but failed to find a papilloma in the lower third of the right ureter which was not bleeding at the time and was not visible at the ureteral meatus.

Diagnosis of carcinoma of the urethra is accomplished by inspection, palpation, and urethroscopy. Such growths are very rare in the male and only occasionally seen in the female. Carcinoma of the bladder is usually diagnosed by cystoscopy. Rectal palpation and cystogram with skiodan and with air may help in determining the size of the growth and the degree of infiltration into or through the bladder wall (Figs. 1, 2, 3, 4). Carcinomata of the ureter and of the renal pelvis are difficult of diagnosis, sometimes impossible. Carcinoma of the ureter is suspected when blood comes from one ureter, the pyelogram being normal and the ureterogram deformed; one may occasionally see the growth or its implants at the ureteral orifice. Sometimes the ureteral growth is an implant from a papillary carcinoma of the renal pelvis. Of carcinoma of the renal pelvis, the papillary type is most common. Any papilloma of the renal pelvis, as of the bladder, is potentially malignant and should be treated as such. It, typically, as in the bladder, gives rise to implants which may be scattered down the ureter and even onto the bladder mucosa. A filling defect may be discovered in the pyelogram. It must be remembered, however, that blood clots and non-opaque renal calculi sometimes cause confusion. Pyelography is our most important single aid in the diagnosis of tumors of the renal cortex. I will show some pyelograms but must add that the interpretation of pyelograms is much too large a subject for detailed discussion on this occasion.* A tumor causing a palpably enlarged kidney mass is quite apt to be found to be inoperable. The patient with a renal cancer is indeed fortunate if his trouble can be accidentally discovered before the onset of any symptoms. We discovered one such tumor during an operation for drainage of a perinephritic abscess. It should be noted that the preliminary study before treatment of any cancer of the kidney or bladder should include roentgenographic search of the lungs, pelvis and long bones for possible metastases.

As to treatment of cancer of the urinary tract there is no universal acceptance of any standard methods.

I believe that all kidney tumors without demonstrable metastases should be explored. Preoperative roentgen or radium therapy for large hypernephromata and for renal tumors of childhood (Wilms' tumors) is highly recommended by some and condemned by others with good reasons on both sides. I prefer immediate exploration. I feel that an incision should be used which will allow clamping of the vascular pedicle before manipulation of the kidney, especially in hypernephromata which are apt to extend into the renal vein. Some advise opening the peritoneum which may be wise in cases of the childhood tumor. However, a good exposure can be obtained by an incision of the type described by Hugh Cabot,[4] in 1925, extending obliquely from the lumbar region to the midline in front near the navel and thence upward in the midline as far as necessary, the unopened peritoneum and colon being reflected medially. Large hypernephromata and Wilms' tumors may or may not receive great benefit from postoperative irradiation. Some advise reliance upon irradiation alone in the Wilms' tumors. On the other hand, Beer[2] recently reported a patient who was well nineteen years after operative removal of a Wilms' tumor, and Wood and Shore[6] have noted a patient who was well seven years after removal of a large hypernephroma. Irradiation is not mentioned in either report. We have followed one patient who has been well for nearly six years now, after nephrectomy for hypernephroma. Isolated cures are being reported frequently enough to show that such cases are not always as hopeless as they at first seem to be. Adenocarcinoma of the kidney should be treated by nephrectomy with removal of as much perirenal fat as possible; the prognosis is not good; implantation of radium into surrounding tissues has been suggested but is beyond my experience.

---

*For previous discussion and illustrative pyelograms by the author, see "Pitfalls in the Diagnosis of Renal Tumors," Minnesota Medicine, 16:235, (April) 1933.

Papillary carcinoma of the renal pelvis and of the ureter should be treated by nephrectomy and complete ureterectomy with removal of the ureteral orifice and surrounding bladder wall; periodic cystoscopy should be carried out later with fulguration of any implants that might develop in the bladder mucosa. Radiation is probably unnecessary for most operable papillary cancers of renal pelvis or ureter, but may be a useful adjunct in treating infiltrating growths, especially the relatively rare squamous cell carcinoma of the renal pelvis.

Carcinoma of the urethra is quite rare and I have seen none. However, Taussig[5] has recently reported four out of fourteen cases living and well beyond five years, three of them treated by excision or radiation with removal of the regional lymph nodes.

There is no agreement regarding the treatment of carcinoma of the bladder. Some treat nearly all by radium alone, some by electrocoagulation alone, some, where possible, by surgical removal, some by cautery and some, in selected cases, by total cystectomy. Most surgeons use combinations of methods or vary the method according to the type of case. There will be disagreement with my remarks no matter what I say. Carcinomas of the bladder vary in size, in type, in grade of malignancy, and in location, and all of these factors have a bearing on the treatment. The age and general condition of the patient and the condition of his kidneys should also influence the treatment.

First, the situation should be surveyed by cystoscopy, cystography, renal function tests, and biopsy, and by x-rays of bones and lungs. If the renal function is poor, one may do preliminary nephrostomy as advised in 1932 by Boyd,[3] rather than to attempt implantation of ureters into the bowel. Then the growth itself should be destroyed completely at once if possible. Our failures come from incompleteness of initial treatment, whether because the growths are beyond treatment when they come or because we are too conservative in the initial treatment. We should consider all bladder growths as at least potentially malignant. We may cure small papillomas by cystoscopic fulguration but we should be very sure to completely destroy the base at the initial treatment. We should repeatedly observe these cases cystoscopically for years to destroy implants and recurrences, remembering that recurrences are liable to be more and more malignant and infiltrative. When in doubt as to the adequacy of cystoscopic fulguration we should open the bladder suprapubically and destroy the growth by excision or resection if in the vault or by cautery or cutting current, combined with electrocoagulation or low heat cooking with cautery if in the base, trigone, or vesical outlet. Radium does not appeal to me as being any more effective than low heat cautery or coagulation, and is known to give very distressing pain when placed in the vesical outlet, and to give large sloughs in some cases. Electrocoagulation seems to have superseded the cautery in many clinics. I have used it successfully but I would like to mention in favor of the latter, that, after cautery removal, the low heat cautery can be applied and the degree of penetration fairly well controlled (with, perhaps, a finger in the rectum) whereas in bipolar electrocoagulation various authors have noted irregular and excessive penetration of the lethal effect, resulting in pericystitis. This has also been seen in radium treatment. I have one patient who is well six years after such a cautery treatment of a squamous cell carcinoma of Grade III malignancy located near the left ureteral orifice, and measuring 2.5 cm. in diameter with a pedicle over 1 cm. in diameter and with distinct infiltration beyond the pedicle. An area of bladder wall over 3 cm. in diameter was thoroughly cooked. That patient has had some fourteen cystoscopies in the six intervening years, with slight signs of trouble only once, within four months after operation. Counseller has remarked that in some cases implants and extensions occur no matter what the form of treatment. I treated one patient with a small growth by fulguration and radium over a period of almost two years with very encouraging results apparently—occasional implants but no signs of infiltration. Then I noted slight signs of irregularity at the original growth and operated suprapubically, to find an infiltrating growth. It finally involved the ureter and led to death from renal infection, as happens in so many cases of bladder cancer. On the other hand I have, on at least two or three occasions, been surprised at the remarkably good, though probably not permanent, relief in very large and malignant growths of the bladder base and vesical outlet by use of surgical diathermy and electrocoagulation. Total cystectomy theoretically should be an ideal treatment. The bladder is not an essential organ, and metastasis does not often occur early from cancer of the bladder. However, transplantation of the ureters to the bowel is not yet a safe procedure in such cases nor are its late results yet proved to be uniformly good. The cystectomy itself is said to be none too simple in some cancer cases. Permanent lumbar nephrostomy or ureterostomy is often not acceptable to the patients. So, in practice, we depend on fulguration and electrocoagulation through the cystoscope or suprapubically; radium or its emanations through the cystoscope or suprapubically; resection or excision if the growth be favorably situated;

and cautery excision, followed by low heat cooking of the base. Each method has its advantages and disadvantages and its field of usefulness. I hope that with all our more modern and more dramatic methods of treatment, we will not lose sight of the advantages of the low heat cautery.

References

1. Barringer, B. S.: Tumors of the bladder. Dean Lewis: Practice of Surgery, 8:11.
2. Beer, E.: Some remarks on five-year cures in malignant tumors. Surg., Gynec. and Obst., 60:479, (Feb. 15) 1935.
3. Boyd, M. L.: Indications for nephrostomy and nephrectomy in carcinoma of bladder. Jour Am. Med. Assn., 99: 1226, (Oct. 8), 1932.
4. Cabot, H.: Operative approach for malignant tumors of the kidney. Jour. Urol., 14:261, (Sept.) 1925.
5. Taussig, F. J.: Primary cancer of vulva, vagina, and female urethra; five-year cures. Surg., Gynec. and Obst., 60:477, (Feb. 15) 1935.
6. Wood, F. C., and Shore, B. R.: Five-year cancer cures at St. Luke's hospital. Surg., Gynec. and Obst., 60:461, (Feb. 15) 1935.

(To be concluded in July issue)

THIRTIETH ANNIVERSARY OF THE COUNCIL ON PHARMACY AND CHEMISTRY

On February 11 the Council on Pharmacy and Chemistry completed its thirtieth year of service to the medical profession. For nearly a third of a century it has made contributions of inestimable value to rational therapeutics. Of the personnel of the Council, which serve entirely without remuneration, four members have been active ever since its organization in 1905. A comparison of the conditions prevailing in the marketing of drugs in this country before 1905 and those obtaining today indicates the debt that American medicine owes to the Council on Pharmacy and Chemistry. The rules governing the acceptance or rejection of remedies adopted in the beginning have gradually been amplified and clarified to meet new conditions. Advertising claims employed by manufacturers of pharmaceuticals for products accepted by the Council have attained standards of accuracy and truthfulness unequaled in any other field of marketing. The *Journal A. M. A.* and many other medical publications in this country, including the journals of all the state associations with the exception of Illinois, accept advertising for Council-accepted or official drugs only. But the Council's work would have come to naught had it not been for the militant aid of the *Journal A. M. A.* and the ever increasing support of the medical profession. Among the important contributions of the Council have been the evaluation of new drugs on the basis of available evidence, the publication of reports giving the results of this evaluation, the standardization with the assistance of the A. M. A. Chemical Laboratory of products that show promise of therapeutic usefulness, and the publication of special articles in review of subjects of current interest to the medical profession. In addition the Council issues several books: New and Nonofficial Remedies (revised yearly), Useful Drugs, the Epitome of the U. S. Pharmacopeia and National Formulary, and (in coöperation with the Council on Medical Education and Hospitals) Hospital Practice for Interns. It continues its important tasks, ever increasing in number and volume, unselfishly and with intelligence and foresight. It merits unfailing support by the medical profession.—*Journal A. M. A.*, February 9, 1935, p. 478.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

ELECTROTHERAPY AND LIGHT THERAPY. Richard Kovacs, M.D., Clinical Professor and Director of Physical Therapy, Polyclinic Medical School and Hospital, New York, etc. 696 pages. Illus. Price, cloth, $7.50. Philadelphia: Lea & Febiger, 1935.

A SUMMARY OF THE TREATMENT OF FRACTURES AND DISLOCATIONS. R. Broomhead, F.R.C.S., Surgeon, Orthopedic Department, General Infirmary at Leeds. 30 pages. Price 3/6d. Leeds (Eng.). Jowett & Sowry, Ltd., 1934.

For the physician who does only moderate amounts of fracture work, this booklet supplies a wealth of material which is quickly available and an amount of information which is remarkably extensive for the size of the pamphlet. It is likewise very accurate and compact, and although no great details of management in the way of methods of reduction or after-care of fractures are contained, yet such cannot be expected, since that is the purpose of a textbook.

Besides the actual management of fractures alone, Part I contains matters of a general nature such as an up-to-date outline on bone diseases, complications of fractures, methods of union, causes of non-union and indications for open reduction, and general principles of the treatment of compound fractures.

As a quick reference on the treatment of fractures, the booklet can be heartily recommended as a source of much information. LAWRENCE M. LARSON.

DISEASES OF THE SKIN. Richard L. Sutton, M.D., Sc.D., LL.D., F.R.S., Professor of Dermatology, University of Kansas, and Richard L. Sutton, Jr., A.M., M.D., F.R.C.P. 9th Ed., 1433 pages. Illus. Price $12.50. St. Louis: C. V. Mosby Co., 1935.

Sutton's volume on dermatology which first appeared in 1916, has been accepted as one of the best standard texts on the subject. The recent ninth edition which was compiled by Richard L. Sutton, Sr., with the aid of his son, Richard, Jr., is of the same high quality as previous editions and is brought up to date by the inclusion of considerations of many new conditions. Hidrosadenitis axillaris, hemolytic streptococcic gangrene, necrobiosis lipoidica diabeticorum, erythroplasia of Queyrat, subepidermal fibrosis, cutaneous amloidosis and ganglioneuroma are but a few of the disorders discussed for the first time in this edition. The sections on coccidioidal granuloma, tularemia and the treatment of syphilis have been revised.

The present edition is a large volume of 1433 pages and is especially valuable on account of the abundance and excellence of the photographs. It should prove to be an admirable volume not only for teaching purposes to the student, but for the practitioner as well.

CARL W. LAYMON, M.D.

CLINICAL MANAGEMENT OF SYPHILIS. Alvin R. Harnes, M.D. 71 pages. Illus. Price $1.50. New York: Macmillan Co., 1935.

This little booklet of 71 pages attempts to cover in a way the treatment of syphilis. The reading matter is, of course, very limited and the information of value is given in the form of charts that outline the treatment of the various phases of the disease. The author is very insistent upon treating the patient for at least one year after the Wassermann findings are negative. He takes up the handling of primary syphilis with a negative serology, primary and secondary syphilis with a positive serology, visceral syphilis, cardiovascular syphilis, central nervous system syphilis, syphilis and pregnancy, congenital syphilis. He is up to date in his ideas and any one that wishes to treat this disease, and has forgotten what to do, can brush up on the latest information on the subject.

The treatment of congenital syphilis takes up the use of acetarsone, or, as he calls the drug, stovarsol. He gives a different dosage than we use at the Minneapolis General Hospital, but as far as that goes almost every one has his own dosage for this drug. I note that he recommends the use of bismuth and mercury along with the stovarsol. We use it alone and have very good results.

All in all, this is a good little book.

S. E. SWEITZER.

CLASSIFIED ADVERTISEMENTS

FOR SALE—Good location for an active M.D. in eastern South Dakota. Address D-289, care MINNESOTA MEDICINE.

PHYSICIAN'S OFFICE FOR RENT—At corner of Thomas and Hamline Avenue, Saint Paul, above drug store. Good business corner. Inquire dentist.

FOR RENT—Doctor's office, corner location, South Minneapolis. Reception room shared with dentist. $18.00 including gas and electricity. Address D-296, care MINNESOTA MEDICINE.

LABORATORY TECHNICIAN desires position in doctor's office or in hospital. Address D-298, care MINNESOTA MEDICINE.

FOR SALE—Standard x-ray equipment; 60 milliampere machine; latest type fluoroscope. All equipment good as new. $1,000 complete. Dr. E. C. Emerson, Saint Paul, Minn. Telephone: Tower 2843.

WANTED—Physician for South Central Minnesota, large territory. Complete modern office available. Address D-299, care MINNESOTA MEDICINE.

FOR RENT—At Hennepin Avenue and Lake Street, Minneapolis, new space on ground floor for dentist and two more physicians. Building well located and occupied by well established doctors. Address D-297, care MINNESOTA MEDICINE.

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society.

Volume 18 JULY, 1935 Number 7

TOTAL THYROIDECTOMY FOR HEART DISEASE*

ELLIOTT C. CUTLER, M.D.†

Boston, Massachusetts

I HAVE long been puzzled why Dr. Judd was so gracious as to ask me to present before you this second Judd Lecture, but on thinking it over I have decided that there must be something peculiar in the relationship between Dr. Judd and myself since, though our ways do not cross any more often than they cross the paths of a multitude of other colleagues, I at least have long reserved for him a special place in my affection. Now I have a reason for this, a reason arising from our first meeting in the year 1915. At that time I was Resident Surgeon at the Massachusetts General Hospital, Boston, and during my vacation made my first trip west of the Hudson River. I scarcely expected to see Indians or buffaloes, but I did look upon this excursion as a most exciting occasion in my education!

I stopped first in Chicago, where my notebook of that day tells me that Dr. Albert J. Ochsner threw me into a turmoil of excitement during my visit to the Augustana Hospital. He operated without gloves, talked volubly most of the time; the patient suffered from goiter and the ether anesthesia was induced through a large mask; this "ether cone" obviously interfered with the operator so that, when the patient was prepared, Dr. Ochsner swept the mask to the floor and proceeded to remove the goiter. The game apparently was to get the goiter out before the patient woke up! It was exciting as well as highly instructive. On the same day I had visited Dr. Allen Kanavel at a hospital in the same city and had seen him operate with great anatomical and surgical skill upon a badly infected hand. That very day I saw three badly infected hands brought to Dr. Ochsner's operating room at the close of his morning's work. He himself dressed them, and told me he rarely practiced incision, that if the arm was put to rest and heat applied most infections of the hand would get well. Thus I left Chicago greatly confused and considerably excited, and went to Rochester, Minnesota.

My chief, Dr. C. A. Porter, had given me letters to Dr. Will Mayo, who happened to be away. I fell first into the hands of Dr. Beckman, whose writings concerning postoperative pulmonary complications had interested me, since I had recently studied this matter and found that almost two per cent of all patients at the Massachusetts General Hospital suffered from pulmonary complications and that, of these, 50 per cent died, whereas Dr. Beckman had reported about 1 per cent morbidity over several years and in one year no mortality in this morbidity! I had expected to learn much concerning how to avoid these complications but in going around in the afternoon I thought I recognized, although I dared not speak of it, many cases with mild postoperative pulmonary complications!

Later during my visit I fell into the hands of Dr. Judd, who was most gracious to an unknown young man, a matter for which I still retain the deepest gratitude. His surgery impressed me greatly. His operating room was quiet, his surgery expeditious yet gentle, and he completely won my devotion because of the friendliness with which he accepted suggestions even when they came from junior associates. I greatly suspect that the high position Dr. Judd now holds in American surgery is in no small part due to his ability to surround himself with young men whose enthusiasms and ideas have greatly benefited his professional career as well as allowed him to retain his youthful appearance of twenty years ago. And perhaps my being here is because Dr. Judd realizes how much I too like to associate myself with young men, to whom I also owe a deep debt of gratitude for both consciously and unconsciously received education.

---

*Second E. Starr Judd Lecture, University of Minnesota Medical School, Minneapolis, February 19, 1935.

†From the Department of Surgery, Harvard Medical School, Boston.

Dr. Wangensteen, your Professor of Surgery, has been good enough to allow me to discuss with you the effect of *total thyroidectomy in the treatment of heart disease*. I am led to present this matter not so much because of its novelty as a therapeutic measure as because it brings up two other matters of general interest. In the first place, it offers a newly acquired principle of surgical thought in that we see the surgeon directing his attack, not at the diseased part of the body, which has been his aim heretofore, but at a part of the body distinct from the diseased organ. The surgeon has at last acquired physiology in addition to anatomy, a momentous occasion, as all first-year students know! The surgical procedure is now directed at a healthy and normal part of the body because the surgeon knows that a shift in the function of that part of the body may improve the condition in a distant and diseased part. This, gentlemen, may represent only a fragment of the surgery of the future. You have doubtless had discussed before you the rôle of the adrenal glands in certain disorders and have heard how peptic ulcer, diabetes, and even epilepsy may be modified by adrenalectomy; you know of the operations which are proposed upon the sympathetic nervous system for vasospastic and obliterative arterial disease, for painful conditions and for megacolon; you have heard of operations upon the spinal cord, such as ventral root division, for hypertension. It is apparent that the application of surgery is undergoing a profound change, of which this procedure of total thyroidectomy is but a single example.

One can imagine that such an attitude of mind will do much for modern surgery. It is a matter first introduced, perhaps, in the surgery of the sympathetic nervous system, for Lériche in his installation address at Strasbourg in 1925 emphasized a day when shifting the nerve or blood supply to a part might bring about changes which would lead Nature eventually to heal the diseased organ without ablation of the part, a form of surgery now distasteful to all modern surgeons.

And again it is important to emphasize this step because mental disciplines and attitudes of mind are the most valuable matters your teacher can give to you. Unfortunately too much instruction may, as you perhaps already know, be harmful, for too much teaching robs one of the opportunity to make an accurate observation. Aristotle wrote that no one over twelve could make an accurate observation because, as he correctly points out, one then makes the observation, not of a phenomenon as it actually is, but of the phenomenon translated through one's past education. It has been partly this which has led to the fact that a great many of our forward steps in science, or at least in applied science, have been made by individuals on the frontiers of civilization rather than by the academicians in the universities. Thus in the field of surgery it was Ephraim McDowell, on the frontier of Kentucky civilization, who first opened the abdomen for ovariotomy, not his distinguished teacher, the great Bell of Edinburgh; and in a recent book entitled "All in a Day's Work," which is the reminiscences of Abraham Groves, a country doctor of Fergus, Ontario, we read of the first application, on the frontier of Canadian civilization, of the sterilization of instruments by boiling as early as 1874, though Lister at this time had hardly begun his antiseptic method. We see at that date successful ovariotomies and vaginal hysterectomies under the aseptic method which university men were not to practice for another twenty years, and we see Dr. Groves on May 10, 1883, removing the appendix for acute appendicitis, though the momentous paper by Reginald Fitz was not written until 1886.

Thus, gentlemen, it is more important that we point out to you how to study and give you attitudes of mind than that we spoon-feed you with the information of our day. Possibly this small contribution of mine today will fall on some fertile mind and lead to a further enrichment of the medical field. I am presenting the matter, therefore, with the hope that it will be a stimulus to your mental attitudes as well as of some value to you later on in your own practice of medicine.

Let us now examine into the *background* and the *reasoning* for ablation of the normal thyroid gland in heart disease. Obviously the removal of such an important normal structure must rest on firm grounds.

I. *Laboratory evidence.* Beginning in 1925 Dr. Herrman L. Blumgart began to investigate the rate of blood flow. These studies culminated in his being able to show a definite relationship between the rate of blood flow and the thyroid function as measured by the basal metabolic rate. He studied patients in many pathological conditions and also normal individuals. Gradually he accumulated evidence that the rate of flow was increased in exophthalmic goiter and slowed in myxedema, the speed of the circulation roughly paralleling the basal metabolic rate. The observation was also made that in cardiac failure the rate of flow was considerably lowered. These observations led Blumgart and his co-workers to suggest that when the circulation in decompensated heart disease could not be speeded up by digitalis, rest, and other appropriate cardiac therapeutic methods, then compensation might be achieved by lowering the demands for an adequate circulation through thyroidectomy. Such a procedure should decrease the speed of circulation as the demand for a normal speed was diminished by the falling basal metabolic rate. It was expected that at some point the crippled supply, as measured by the rate of blood flow, would come into equilibrium with the lowered demand imposed by the thyroidectomy and thus compensation would result. Such reasoning based on the careful studies preceding it seems to justify thyroidectomy in patients with circulatory failure. The original human attempts along this line consisted of subtotal thyroidectomies, and such cases corroborated the hypothetical reasoning in that, as the basal metabolic rate dropped, a point was reached where compensation was achieved. The relief in such cases, however, was only temporary, for with regrowth of the remaining fragment of the gland the basal metabolic rate was restored to normal and coincident with this the demand upon the circulation went back to its previous level, a level which the cripped heart could no longer maintain, resulting in a return of the clinical signs of circulatory failure.

II. *Clinical evidence.* Equally important with the laboratory evidence are the observations which have been made at the bedside of people ill with thyroid disease over many years. It will not surprise you to recall that both Billroth and Kocher were among the first to remove the thyroid gland, but it should be remembered that the early operations were lobectomies or total thyroidectomies, not subtotal removals, since the modern operation was not developed by Kocher until 1890. These surgeons made the observation that an unexplained but great improvement appeared following thyroidectomy in certain patients in whom circulatory failure had been present. From that time on evidence constantly accumulated that there is a relation between thyroid and cardiac functions. It was gradually noticed that a certain number of patients with decompensated heart disease, in whom a preëxisting history of thyrotoxicosis was obtainable, were entirely relieved of their cardiac failure syndrome by subtotal thyroidectomy. In this thyrocardiac group, even in the presence of fibrillation and marked symptoms of failure, those remarkable restorations to an almost normal circulatory function occur after subtotal thyroidectomy. But the story is not to be told only in terms of the basal metabolic rate, for evidence has been presented by Morris that hearts damaged by thyroid activity occur in individuals in whom the basal metabolic rate has not been elevated, as if that part of the secretion of the thyroid that damaged the circulation was not necessarily a part of the substance which controlled the basal metabolic demands. This idea has only lately assumed a rôle of major importance and now we find some observers placing a reliance upon the cholesterol level equal to that placed upon the basal metabolic rate as an evidence of thyroid activity. Thus, though many observers have reported brilliant results in certain cases with advanced cardiac disease and mild thyrotoxicosis following thyroidectomy, it is possible that the level of the basal metabolic rate is not the best way of determining the "thyrocardiac group."

But there is a great deal more evidence of this thyrocardiac relationship, for there are tucked away in medical literature case reports of arythmia and tachycardia relieved by thyroidectomy, and more recently Frank Wilson of Ann Arbor has found the relationship of the thyroid to cardiac function so close that he has presented evidence and statements that Graves' disease may be recognized by an examination of the heart even before there has occurred an elevation of the basal metabolic rate. This interrelationship is seen again in non-toxic goiter cases, for both Reid of Cincinnati and Coller of Ann Arbor have shown that following the subtotal operations upon patients with endemic goiter circulatory abnormalities disappear. This interrelationship of the thyroid and the heart, as observed in the clinic, has stimulated a certain amount of laboratory investigation and we now know that the administration of thyroxin to animals produces an alarming disturbance of the cardiac function.

The observations given above, including both laboratory and clinical work, seem to join closer and closer together cardiac and thyroid functions. Finally, the evidence that thyroidectomy may slow the rate of flow has justified the removal of what appeared to be normal thyroid glands in an attempt to balance supply and demand in *decompensated heart disease.*

Before attempting to show you some of the effects of total thyroidectomy, let me make one more attempt to clarify the above reasoning by use of a chart. The compensation clock (Fig. 1) is an attempt to show the parallelism of circulatory efficiency and the basal metabolic rate.

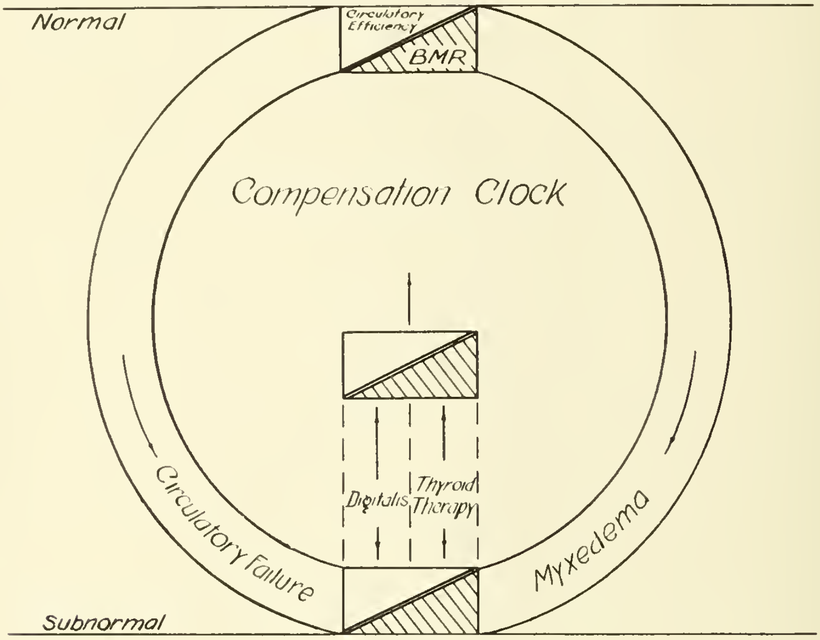


Fig. 1. Compensation clock.

You will recall that the basal metabolic rate is in direct relation to the circulatory rate and that these factors must remain in equilibrium in order to have compensation. If circulatory failure develops, there is slowing of the speed of the circulation. If the basal metabolic rate remains normal, the speed is well below that demanded by the basal metabolic rate and therefore decompensation results. If one tries to push circulatory failure up toward normal by the use of digitalis and rest and cannot push it up to its normal level, the only way one can bring the rate of circulation into equilibrium with the basal metabolic demands is to drop the latter to the same level. This can be accomplished by thyroidectomy. By total thyroidectomy one can drop the basal metabolic rate to any level desired. If the circulatory rate is only a little slowed by circulatory failure, then the basal metabolic rate need only be dropped to a point just below normal. This point can be determined by the re-establishment of compensation and measured by studies of the speed of circulation in relation to the basal metabolic rate. The desired level can be maintained by administering the proper amount of thyroid extract.

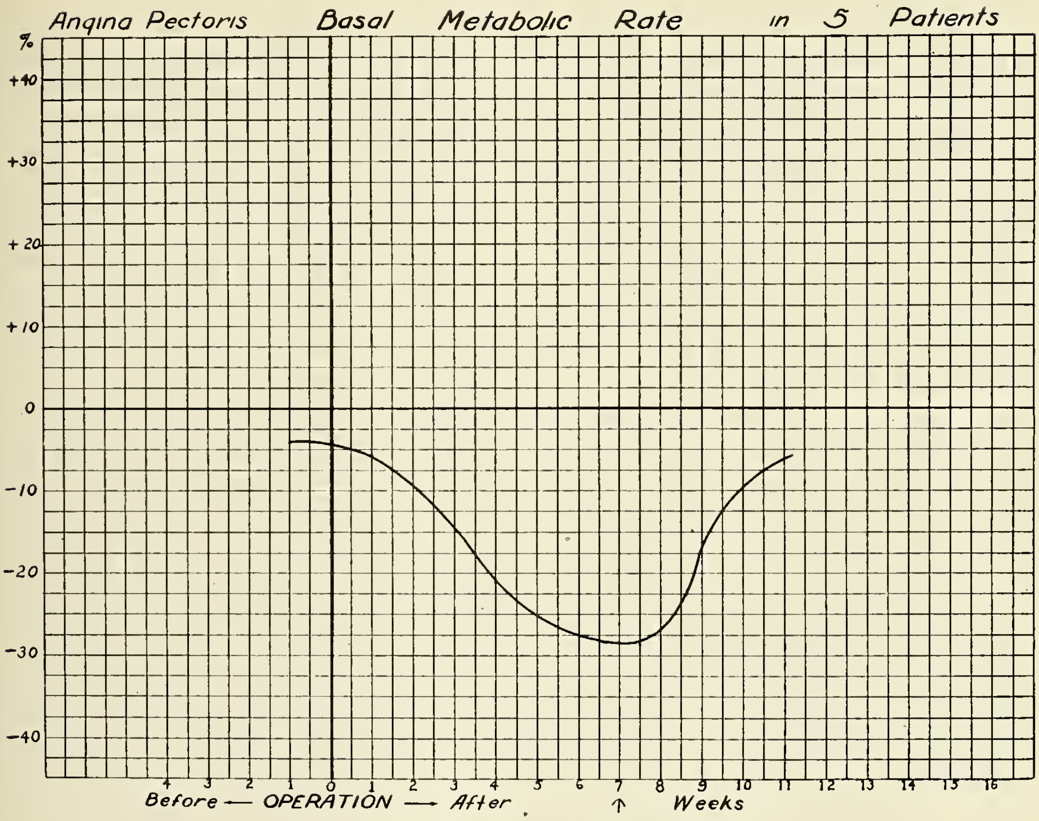
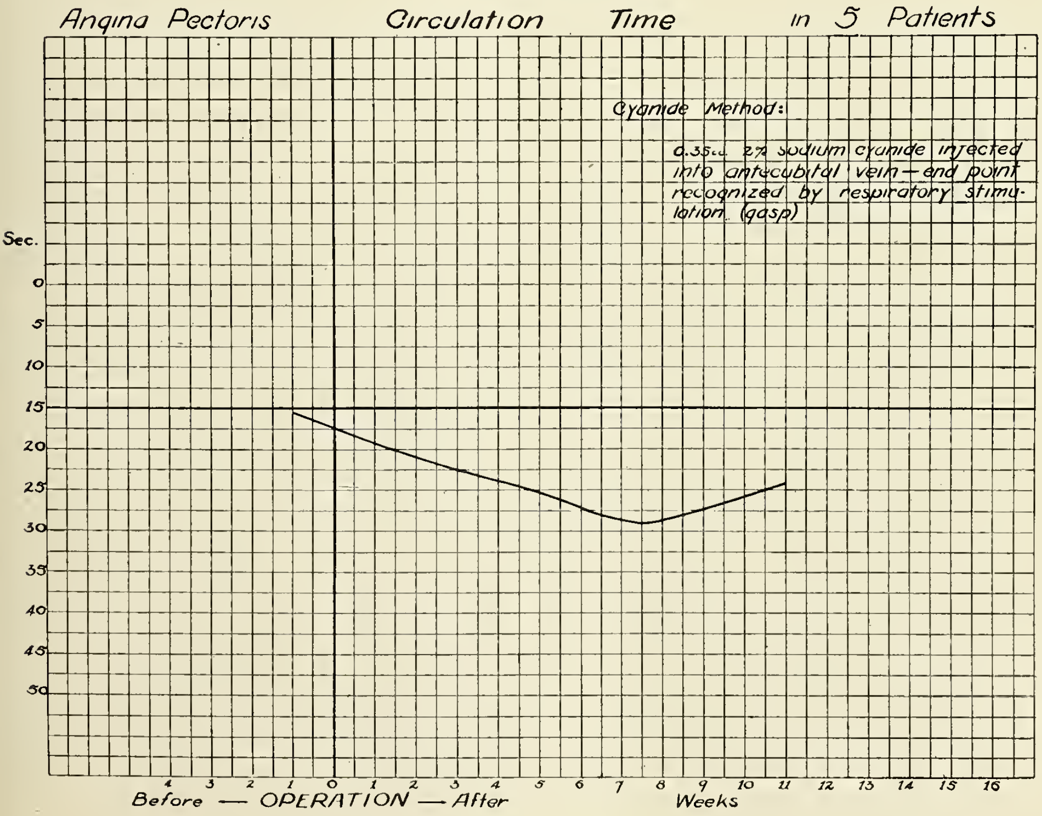

Angina Pectoris Basal Metabolic Rate in 5 Patients

Fig. 2. Basal metabolic curve.


Angina Pectoris Circulation Time in 5 Patients

Cyanide Method:

0.35cc 2% sodium cyanide injected into antecubital vein—end point recognized by respiratory stimulation (gasp)

Fig. 3. Circulation time curve.

Now let us study certain reactions to thyroidectomy which are definite and which always occur. First, the basal metabolic rate. Fig. 2 shows the average curve of five patients with angina pectoris following total thyroidectomy. Note the steady drop in the basal metabolic rate until at seven to eight weeks a basal metabolic rate of —28 is reached. At this point thyroid therapy was commenced and one sees the restoration toward a former normal level.

Figure 3 shows the circulation rate response to total thyroidectomy. Again we see the average of the studies in five patients. The method used is the cyanide method. We inject into the antecubital vein 0.35 c.c. of a two per cent sodium cyanide solution and test the end point by sudden respiratory stimulation which is usually recognized by a deep gasp. The end point is definite and easily noted. The normal rate for this test is from fifteen to sixteen seconds in healthy young adults. It was twenty seconds in our angina pectoris patients who had no evidence of failure but whose age was above the average utilized by Robb and Weiss. We see in this curve that again in about seven and one-half weeks the rate is doubled in time, slowing from close to fifteen seconds to close to thirty seconds. Again with the use of thyroid extract at this time the curve can be reversed and the rate brought back to normal.

Another classical reaction is seen in Figure 4 in the blood cholesterol curve. Here, starting with an average level of around 300 mgm. per cent, we see at seven weeks an average of 420 mgm. per cent. With the administration of thyroid extract at this time the curve is again restored toward normal. In this particular study five patients with angina pectoris were utilized. Taking all of our angina pectoris cases (twenty-two patients), the average preoperative blood cholesterol was 230 mgm. per cent, whereas in the cardiac failure group, a somewhat younger group, it was 182 mgm. per cent. The normal may be roughly between 150 and 250 mgm. per cent. In our series the highest cholesterol level attained in myxedema was 744 mgm. per cent, with an average for all patients in the angina pectoris group of 475 mgm. per cent and in the failure group of 315 mgm. per cent.

In Figure 5 we have superimposed all these curves showing the reversibility of all procedures with thyroid therapy. Once having arrived at a level where either pain has disappeared in the angina pectoris group or compensation has been achieved in the failure group, thyroid therapy has been begun. We found that utilization of 0.015 gm. of Armour's thyroid extract daily would, as a rule, maintain patients at any desired level. If we wished to push the basal metabolic rate back toward normal a little further, 0.030 gm. of extract was given for a short period of the time and when the desired level was reached again it could be maintained by the lower dosage.

Further control studies in all patients concerned the usual blood chemistry determinations. The blood phosphorus level was not affected by total thyroidectomy to any great extent, though in two cases with mild symptoms of parathyroid deprivation where the blood calcium level was lowered the phosphorus level rose slightly. Blood calcium levels were affected only in those cases where accidental removal of parathyroid substance caused symptoms of mild tetany. No cases of serious tetany have arisen and in only five cases has there been enough irritability to suggest clinically the condition of parathyroid insufficiency. In these patients a Chvostek sign and Trousseau sign could be elicited. In one case the blood calcium dropped as low as 6.8 mgm. per cent. The slight tetanic signs which appeared were alleviated by viosterol, twenty drops three times a day, and three grams of calcium lactate by mouth three times a day. These substances seem to be even more efficacious than parathormone, which was utilized in only two cases for control studies of the calcium levels. The patient with the blood calcium as low as 6.8 has gradually in a year and a half built this level up to within normal limits and is without further signs or symptoms.

Determinations of sugar tolerance were carried out on most of the patients and the results may be summarized as follows: (1) in patients presenting normal blood sugar levels total thyroidectomy brought about no appreciable change; (2) in patients with diabetes, our observations have shown that as these patients entered myxedema there was an increased tolerance to sugar. Thus one patient, starting with a fasting blood sugar of 400 mgm. per cent and requiring 75 units of insulin a day in addition to dietary restriction, is now, a year following total thyroidectomy, showing occasional insulin reactions

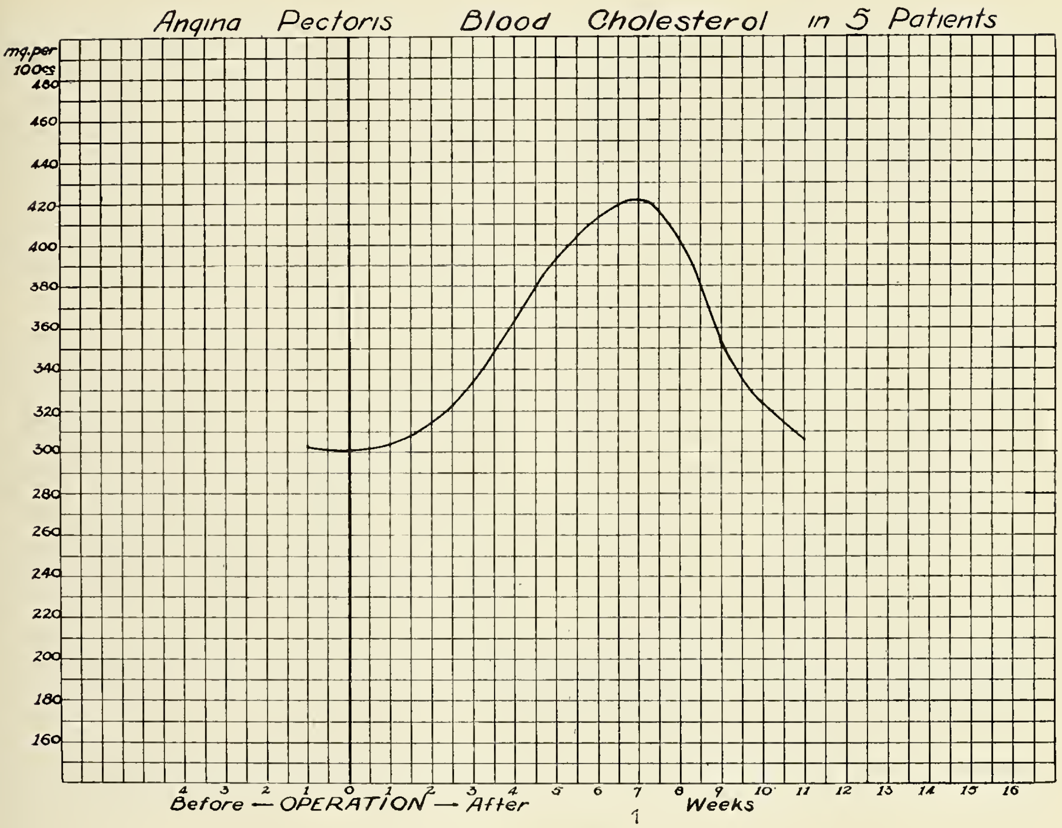


Fig. 4. Blood cholesterol curve.

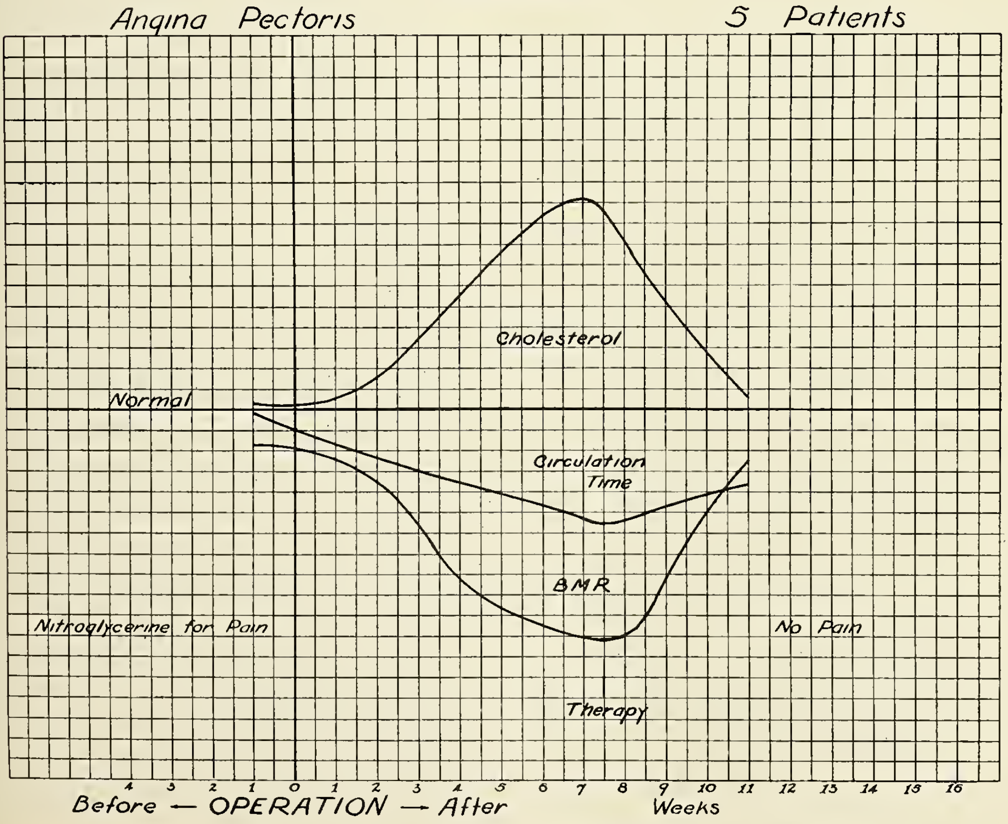


Fig. 5. Superimposed curves of blood cholesterol, circulation time, and basal metabolic rate.

though receiving only 20 units of insulin a day with the same diet. This patient does not show the clinical signs of myxedema and the basal metabolic rate is maintained at —15. This fragment of the work is reserved for a future presentation, for the interpretation of what has occurred is not yet clear.

Observations were also made of the skin temperature reactions of all these patients before and after total thyroidectomy and these may be summarized as showing an increased vasodilator ability following total thyroidectomy. Thus patients in myxedema show an initial low skin temperature, probably due to the infiltration of skin with fluid. Such patients, however, when subjected to vasodilator stimuli, reveal a rise of temperature to a higher level than that obtainable before total thyroidectomy.

Many other tests were carried out in order that in such a new undertaking we might protect our patients as well as learn as much as possible concerning man's ability to survive under the conditions imposed by total thyroidectomy. One of our chief worries has always been the mental status which might result from total thyroidectomy. For that purpose competent individuals in psychiatric research set up for us a large number of both simple and intricate symbol tests. All patients were submitted to these intellectual ordeals before total thyroidectomy and their sensory and motor mental responses standardized. Studies at this time, averaging in the survival cases about eight months, show no loss in their intellectual ability to respond. In fact, for the moment the responses are, if anything, exalted and patients in mild myexedema show greater facility mentally, as regards both their sensory and motor mental functions, than before total thyroidectomy.

Other popularly conceived ideas of the effect of total thyroidectomy were checked upon. Thus a summary of the blood pressure studies of all the cases shows an average rise of blood pressure of 10 mm. of mercury systolic and 10 mm. of mercury diastolic at the end of sixteen months of observation. Studies of the blood itself, since anemia is taken as one of the signs of myxedema, show at the end of this same period of observation some slight secondary anemia. Further studies concerned sex function, though many of the patients are of the older group and thus the test is limited in numbers. Inquiry has shown a return of sex life in three males who considered themselves impotent before thyroidectomy, and in one case a woman who had not menstruated for four years has now resumed normal menstrual periods.

This résumé of the results which follow total thyroidectomy in man can perhaps be visualized to you in the following cases:

First, a case of *angina pectoris:* M. P. was a German housewife of sixty who complained of burning pain beneath the sternum radiating to the left arm, with exertion, for the last eight years. The amount of pain, the duration of the attack, and the frequency of attacks steadily increased until for the last two years before entering the hospital she had been bedfast and had taken nitroglycerine in increasing amounts daily, though recently it had only slightly diminished her pain. The blood pressure was 170/70; the liver was 8 cm. below the costal margin; electrocardiogram showed left ventricular preponderance. Figure 6 visualizes part of her course. Note that as the basal metabolic rate fell the velocity of blood flow was slowed and at the same time her cholesterol rose. Finally, when the basal metabolic rate had reached —28, thyroid medication was started and the curves all commenced to reverse themselves. At present, with a basal metabolic level of —15, there is some slowing of the circulation and some slight elevation of the cholesterol. This patient has remained an active housewife without pain except for one occasion when she carried a large amount of coal into her lodging house. She now takes automobile rides, does her housework, and has changed from a bedfast patient to an individual with an active life free from pain. At the same time, she is kept above the clinical myxedema level by thyroid medication.

Let us now take a case of *valvular disease:* C. C., thirty-three years old, was a married garage worker and at the time he entered the hospital complained of shortness of breath. This was his first bout of failure, which began some two months before admission, with dyspnea on exertion, finally orthopnea, pain in the epigastrium, pounding of his heart, swelling of his ankles and cough. On admission he was orthopneic, dyspneic and cyanotic. The heart was enlarged 14 cm. to the left, and there was a marked rumbling diastolic murmur and a loud blowing systolic murmur. The rhythm was grossly irregular with a pulse deficit of 20. There were râles at both bases, edema of the feet, ankles and legs, and his liver was four fingers' breadth below the costal margin. For ten weeks he had rest in bed and digitalis in every form and in large amounts without any effect. Then he was submitted to total thyroidectomy. In ten days the liver was beneath the costal margin, he was able to sleep flat in bed and finally, after two months, he took a job driving a truck, which he is still able to continue to do at the

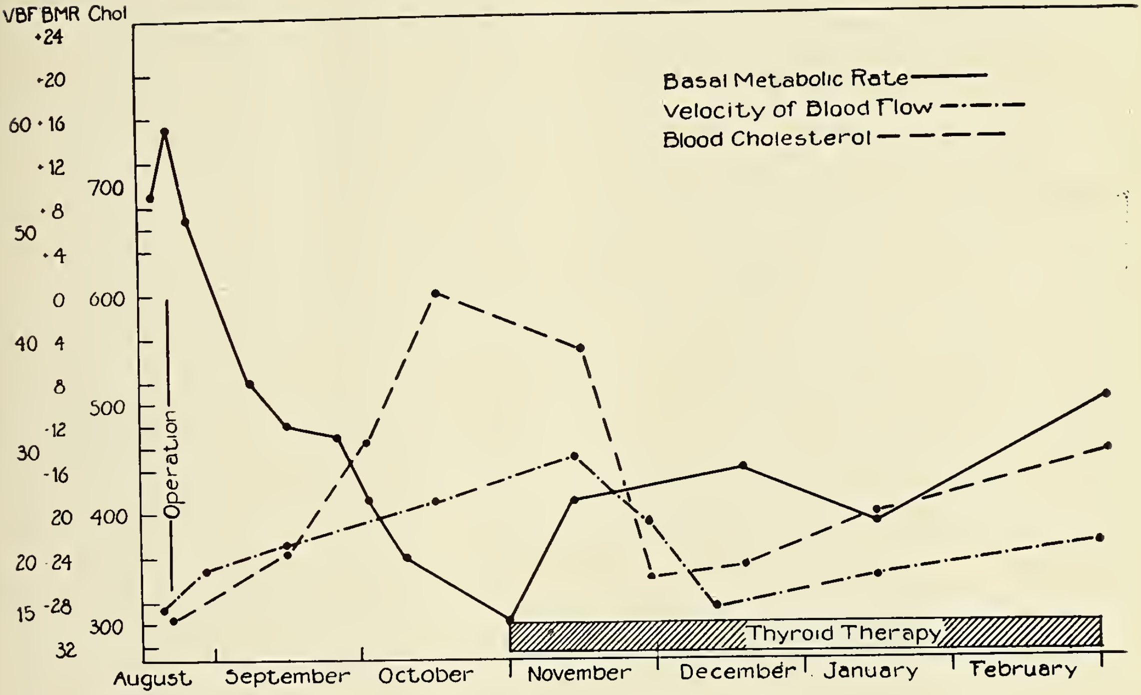


Fig. 6. Studies of basal metabolic rate, velocity of blood flow and blood cholesterol following total thyroidectomy in a case of angina pectoris.

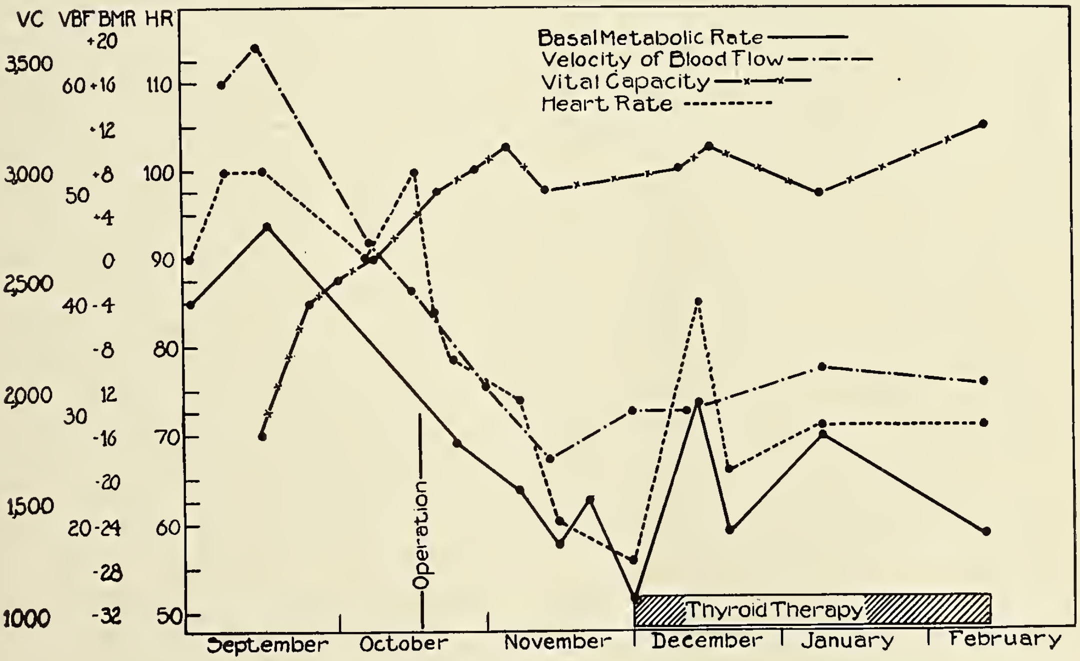


Fig. 7. Studies of basal metabolic rate, velocity of blood flow, vital capacity and heart rate before and after total thyroidectomy and later following the addition of thyroid therapy in a case of cardiac decompensation with mitral stenosis.

present time, sixteen months following the operation. Figure 7 shows the early part of his hospital career. Note that following his operation the basal metabolic rate fell steadily. With its fall the vital capacity rose. The heart rates slowed but the velocity of blood flow increased.

In this patient we see the reverse of the expected happening, for the speed of circulation is *increased* by total thyroidectomy and the resultant myxedema. This will frequently happen in patients with severe decompensation, for as thyroidectomy lowers the demand upon the circulation compensation results, and actually the speed of circulation demanded by the myxedematous condition is faster than the speed of circulation present in decompensation. Once compensation is achieved, the speed of circulation follows the basal metabolic demands and is faster than the speed present in severe decompensation.

Next let us consider a patient with *chronic myocarditis:* L. W. was a colored male of forty-three who complained of shortness of breath and easy fatigability for four years. Within two years he had become incapacitated and had had several severe attacks of substernal pain on exertion. Then paroxysmal dyspnea had appeared and he had started to take digitalis. About six weeks before admission he had become bedfast, edema of the feet and ankles had appeared, respiratory rate was unstable, mental confusion had set in and he was finally brought to the hospital in a semi-comatose condition. On admission there was Cheyne-Stokes respiration, great mental confusion, blood pressure 210/144, hemorrhages in both retinæ, enormous heart enlarged to the left with a loud systolic murmur at the apex, and a grossly irregular rhythm. The liver was 8 cm. below the costal margin and there was marked edema and râles in both bases. A long medical regimen with digitalis, salyrgan, and rest failed to bring about compensation and finally he was submitted to total thyroidectomy. He now works as janitor at a fire station, comes to the clinic on foot when desired, seems comfortable and, except for troublesome ascites, is relieved of pain and his decompensation. Figure 8 shows a fragment of this man's clinical course, largely that part which visualizes how all these reactions can be made to reverse and shift with thyroid therapy. At a period late in his postoperative course thyroid medication was forced in order to study what would happen to this patient if his basal metabolic rate was restored to normal. Note that his basal metabolic rate, which was around —40, was pushed up to just above normal with thyroid medication. As the metabolic rate ascended toward normal, his heart rate mounted rapidly, and his vital capacity fell to within alarming limits. Coincident with this there reappeared the complete picture of cardiac decompensation which he presented upon admission. Thyroid therapy was then withdrawn, the basal metabolic rate fell to its previous level around —30 and the patient abruptly became compensated.

Finally, let us study Figure 9: S. G., a woman of forty-nine already had severe *spontaneous myxedema* and had been under observation for five years in our Out-Door Department. Gradually over a period of years, her metabolic rate having been restored to around —20 through thyroid medication, she developed typical angina pectoris. Because of theories concerning angina pectoris which are shortly to be spoken of, we felt that thyroidectomy, though you may well smile at removing the thyroid from a patient already severely myxedematous, might benefit her. Therefore, total thyroidectomy was carried out and, to be sure, there was a thyroid gland, largely composed of fat, but containing within its capsule and scattered throughout the fat within the thyroid capsule many thyroid acini easily picked up under the microscope. Following this total thyroidectomy the basal metabolic rate was allowed to drop to —40, was held there for a period of time, and finally was brought up to its preceding level of —15 to —20 without the return of angina. In such a case one may hypothesize that desiccated thyroid extract does not contain all the principles of thyroid secretion.

TABLE I. SURGICAL MORTALITY AND MORBIDITY STATISTICS.

Total Number of Cases		54
Cardiac Decompensation		
Valvular Disease	15	23
Myocardial Disease	8	
Deaths		
Immediate Postoperative	2 (8.7%)	8
Late Unrelated to Operation	6 (26.1%)	
Angina Pectoris		31
Deaths		
Immediate Postoperative	2 (6.5%)	7
Late Unrelated to Operation	5 (16.1%)	
Complications		
Parathyroid Tetany	5 (9.3%)	9
Recurrent Laryngeal Nerve Injury	4 (7.4%)	

I presume you must be somewhat interested in clinical results though I myself feel that the observations made which do not relate to the cardiac aspects of this problem are quite as important or even more important than those which actually relate to applied therapy at this time. We have to date removed sixty-four normal thyroid glands in this particular study, some, as suggested, for diabetes and for peripheral vascular disease in addition to cardiac disorders. Table I covers a fairly recent summary of our clinical work. You will see that the cases are divided into those with cardiac decompensation and those with angina pectoris. The immediate mortality rate has been low, lower perhaps than one might hope for in patients with these disorders should they have to be subjected to any other similar surgical procedure. Indeed, since patients with angina decubitus (for all the patients in the angina group were patients with pain even at rest) are threatened with disaster daily, we may look upon the figures in either group as a remarkably low immediate postoper-

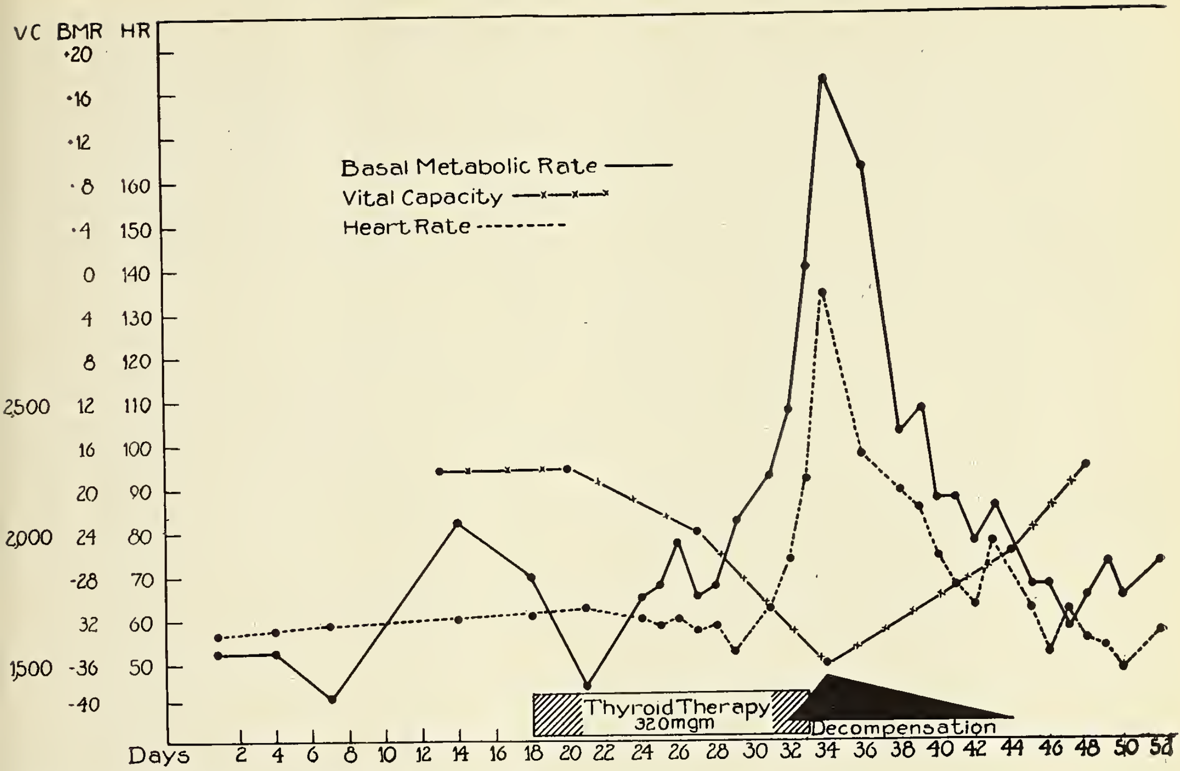


Fig. 8. Chart showing the effect of thyroid therapy upon the basal metabolic rate, vital capacity and heart rate in a patient with cardiac decompensation due to failing hypertensive heart disease at a period some months after total thyroidectomy, and showing the ease with which physiological reactions can be reversed.

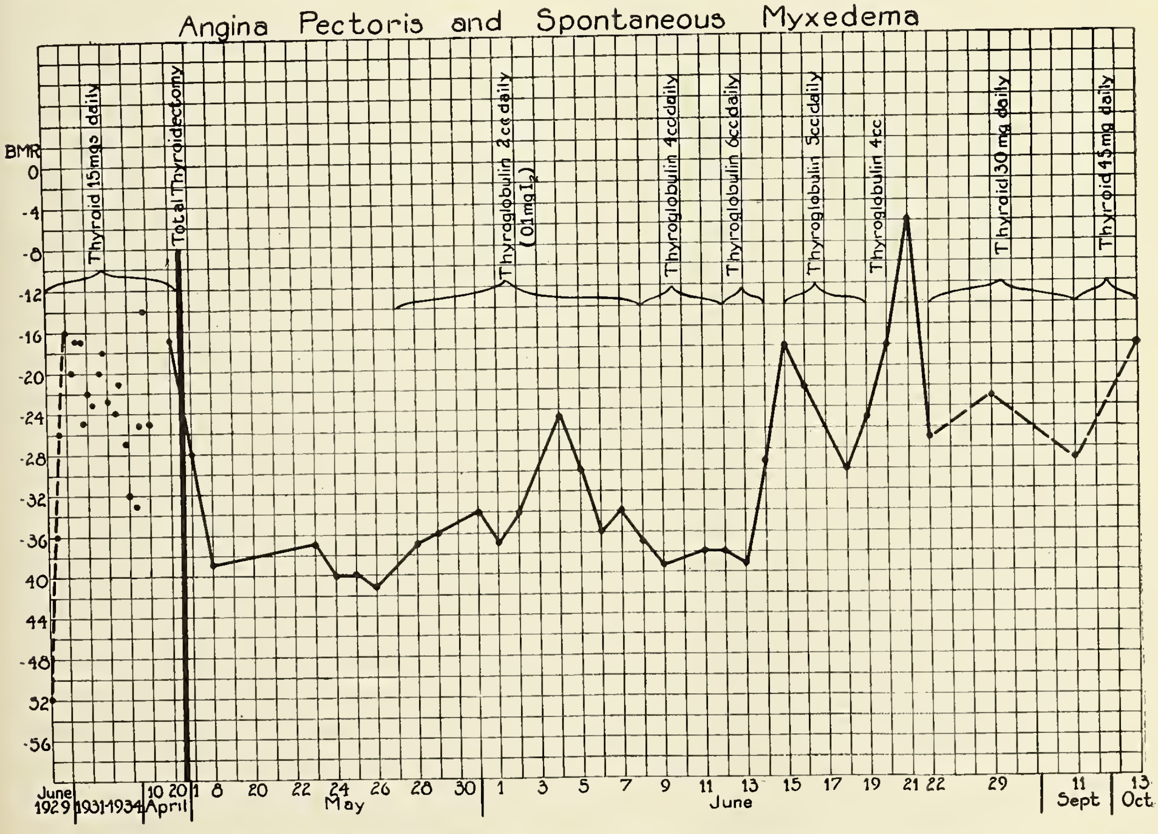


Fig. 9. Chart showing the basal metabolic rate studies on a case of spontaneous myxedema with angina pectoris before and after total thyroidectomy.

ative mortality. No patient has died during the operation; the two immediate deaths in the cardiac decompensation group come within the group of myocardial disease, elderly males with failing hypertensive heart disease whose myocardial reserve was insufficient to stand any excess burden and whose hearts steadily failed following the operation. In the group of angina pectoris, the two immediate deaths were apparently classical attacks of coronary closure on the first and second postoperative day, attacks similar to those which had occurred previously in these patients and which might have been expected at any moment. The later deaths have all been recorded, since the matter of longevity in patients following total thyroidectomy is an interesting speculation. Two of the patients died elsewhere during operations for gallstones though we, knowing these patients had gallstones, carefully warned them not to submit to operation for this disorder. In the group of cardiac decompensation the later deaths were typical of cardiac failure, some with infarcts preceding the final failure and some simply cardiac failure alone.

There were no particular complications, though mild signs of parathyroid tetany as already described occurred in the five cases and there was injury to the recurrent laryngeal nerve in four cases. These recurrent nerve injuries occurred early in our attempts to carry out this procedure and were due to my insisting upon operating from the right side only, a position I had always assumed for simple subtotal thyroidectomy, and it was only when I had injured three left recurrent nerves while operating from the right side that I learned to remove each lobe while operating on the homologous side. Visualization of the recurernt nerve is the only essential feature of the operation and this can best be done from the side on which it lies.

The operation itself presents no other difficulties. We have utilized local anesthesia throughout all procedures, preceded by a fairly good-sized dose of morphine. We have never had to divide the pretracheal ribbon muscles and once the gland was exposed and its extent ascertained, for one must remember a pyramidal lobe should be followed to its very limits, the upper pole vessels were ligated above the capsule and the gland attacked at its inferior limits, first dividing the superficial veins, then identifying the recurrent nerve and sweeping the gland away from it. We have always found the recurrent nerve to loop through branches of the inferior thyroid artery and we have never seen it except as an extra-capsular thread. It has been reported by others to lie within the substance of the thyroid gland. I can only say that in sixty-four cases this has never been the case.

TABLE II. CLINICAL RESULTS IN THIRTY-FOUR PATIENTS WHO HAVE LIVED MORE THAN THREE MONTHS SINCE OPERATION.

Group II Cardiac Decompensation (10 Valvular disease, 2 Myocardial)	
Excellent	5
Good	4
Fair	3
Total	12
Group II Angina Pectoris	
Excellent	12
Good	4
Fair	6
Total	22

Excellent—restored to active life without complaints.
Good—greatly improved but inactive (decompensation cases) or occasional pain (angina cases).
Fair—improved but still incapacitated.

Table II reveals our final statistics and has been compiled by three separate observers of the records and of the patients themselves. Considering that all cases were of the most serious type, the results are gratifying. It must be remembered that the people in the heart failure group were all bedfast individuals, unrelieved by modern medical means, and that all the people in the angina group had angina decubitus, that is, frequent attacks of pain without effort. Many in both groups have been restored to a fairly active and comfortable life.

There remains one fragment of this work which I trust you have already questioned. That is the explanation of why people with angina pectoris are given relief, for people with angina pectoris do not necessarily have cardiac failure and in our group, though they were the seat of angina decubitus with pain at rest, their circulatory efficiency was fairly normal. We have set up, therefore, a new explanation for the relief in this group of cases. Angina pectoris is a disorder in which it is generally accepted that the painful seizures represent periods of myocardial ischemia, an explanation warranted by the frequency of coronary occlusive disease, in most patients suffering from the disorder. One might

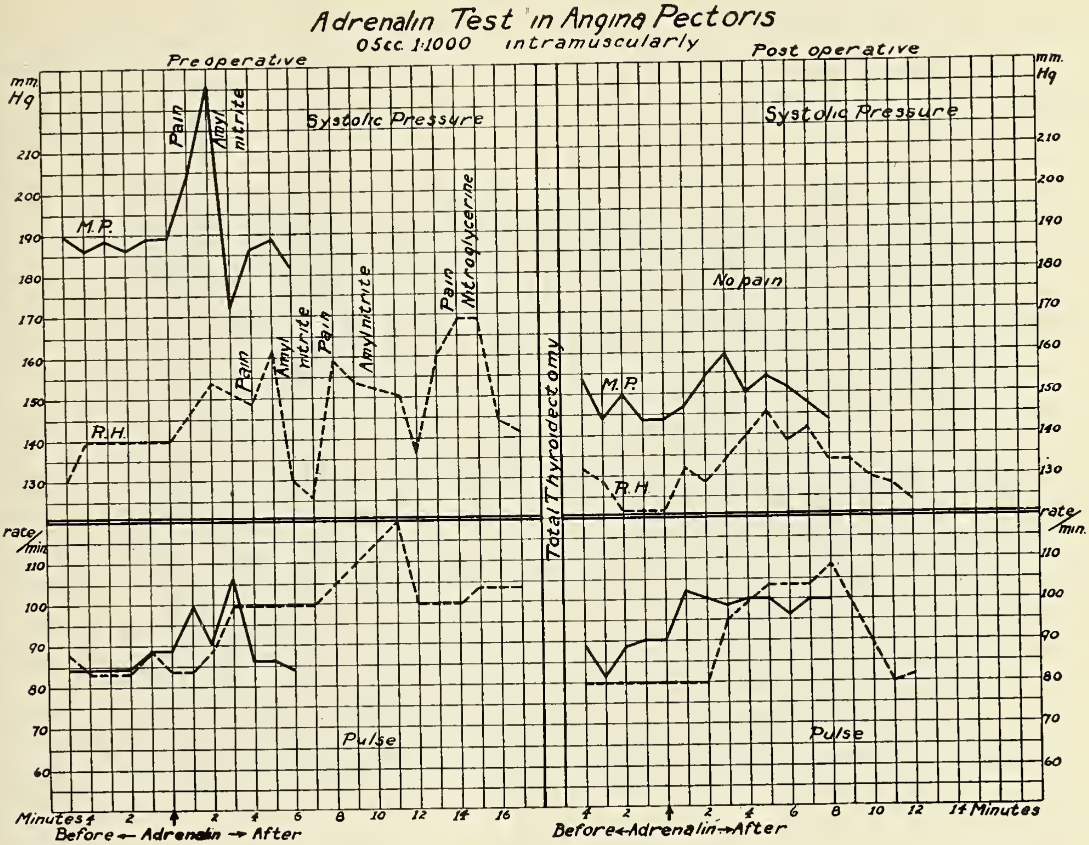


Fig. 10. Adrenalin tests in angina pectoris.

say that in such cases dropping the demands upon the circulation by lowering the basal metabolic rate would give to the individual patient an added factor of safety in that the occasional added exertion, if the patient was living at the limit of cardiac capacity, might bring about symptoms. However, in the absence of any diminution in the speed of circulation we have felt that the reasoning applied to the relief in failure cases could not be applied to angina cases. Early in our studies we made a special observation concerning the response of these patients to adrenalin.

Thus you will see on Figure 10 blood pressure records of two typical cases of angina pectoris before and after the administration of adrenalin. You may recall that the subcutaneous injection of adrenalin has been utilized already by cardiologists for unmasking the "formes frustes" of angina and it has been shown that the subcutaneous injection of adrenalin, with sudden rise in blood pressure will often call forth a typical anginal seizure. This is not a matter for routine use and should be attempted only by specialists thoroughly competent in this field, since provoking such attacks may bring on attacks of coronary closure. Note on the chart that the patient M. P., starting with a systolic pressure of 190, showed following the subcutaneous injection of 0.5 c.c. of 1-1000 adrenalin an abrupt elevation of pressure, the systolic pressure reaching 225. Coincident with this there was excruciating substernal pain with typical radiation to the arm. Amyl nitrate was administered, the pressure abruptly fell, the pain disappeared and a normal situation ensued. Within twelve hours of total thyroidectomy note that her resting blood pressure was 155. Again 0.5 c.c. of 1-1000 adrenalin was injected subcutaneously, there was very slight elevation of the blood pressure, which rose only ten points, no pain was induced, and the patient remained normal and comfortable. The next day into this patient was injected subcutaneously 1 c.c. of 1-1000 adrenalin. Again there was no pain.

In the other case, R. H., the same phenomena were noted. With the injection of adrenalin there was some elevation of pressure with pain, relief with amyl nitrate, spontaneous recurrence of pressure and pain as the amyl nitrate effect wore off, more amyl nitrate with again absence of pain and reduction of pressure, again spontaneous recurrence of pressure, again and final lasting relief on the administration of nitroglycerine. In this patient also twelve hours after total thyroidectomy no pain occurred with subcutaneous injection of adrenalin.

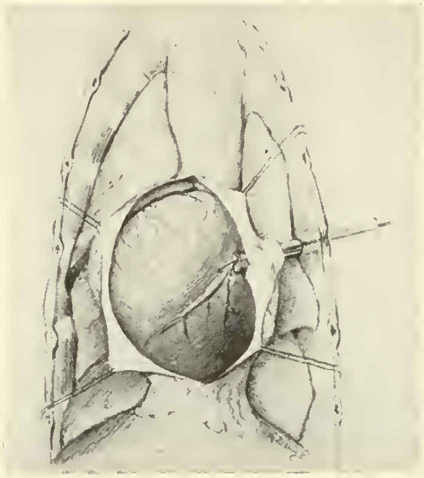


Fig. 11. Application of string about coronary vessel of dog in experimental angina pectoris.

This observation, which has been repeated, would seem to be of great importance in understanding the mechanism of painful seizures in angina, for it would seem that total thyroidectomy modified in our patients the action of adrenalin. To study this mechanism further a simple experimental study was set up. We utilized the Sutton and Lueth coronary occlusion method (Fig. 11). A dog's chest was opened, a string passed around the major descending coronary vessel, the string led out through a glass tube and the chest closed. When the animal was conscious, pulling on this string provoked pain recognized by the struggling of the animal and shifts in breathing and other measurable symptoms and signs. This method had been utilized previously to support the contention that coronary occlusion was a cause of anginal seizures. With such a preparation we found one could weight the threads, which were passed over pulleys, and that weighting these threads up to a certain point did not cause pain. Such a method is seen in Figure 12. With this method the following experiments were carried out. Adrenalin was injected without weighting the string (Fig. 13), using a simple vasopressure dosage amounting to 0.1 c.c. of 1-1000 solution intravenously. Such an injection causes no pain in the animal. However, if the strings are weighted with 100 gm., which of itself would produce no pain but which does produce mild coronary occlusion, then a repeated dose of adrenalin of the same amount produces excruciating angina. These two observations would seem to indicate that the output of the adrenal gland plays a rôle in the occurrence of anginal pain.

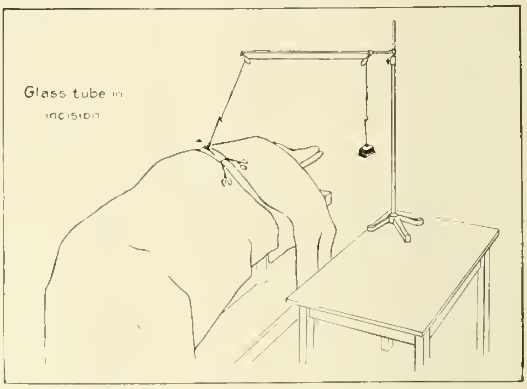


Fig. 12. Method of weighting string in experimental angina pectoris.

We know that total thyroidectomy does not modify the output of adrenalin but these observations would seem to point to the fact that, though the output of the adrenal gland is not modified, the substance produced is less effective under the conditions imposed by total thyroidectomy. There is further clinical evidence to support this thyroid-adrenal mechanism in angina since we have no adequate explanation today unless we invoke this relationship for explaining attacks of angina when the patient is at complete rest. It is a well-known clinical observation that a patient lying quietly in bed when mentally disturbed will have typical anginal seizures. The one mechanism which can be disturbed by such mental perturbation is the adrenal mechanism. Worry, anxiety, psychical disturbances of any type may produce a large discharge of adrenalin and it seems to us that this must play a rôle in the explanation of anginal pain as described above. Where total thyroidectomy produces its effect we as yet have no explanation. It may produce it by interfering with the sensitivity of the vasomotor apparatus to adrenalin as already indicated by the studies of skin temperature following total thyroidectomy where we find greater vasodilator ability even in myxedematous people.

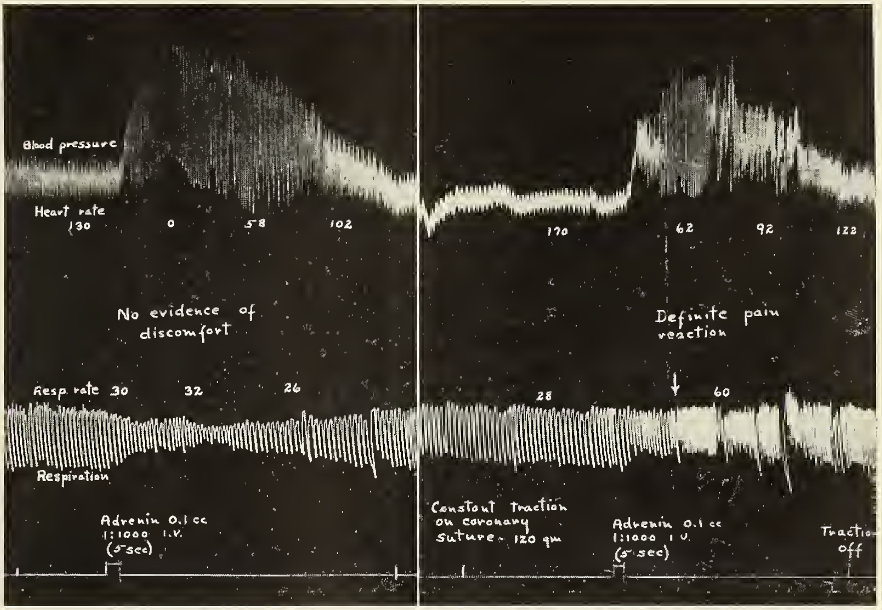


Fig. 13. Kymographic tracings of blood pressure and respiratory rate in animal (a) before and after adding adrenalin, and (b) before and after adding adrenalin with the addition of a constant traction of 120 gm. on the suture about the coronary vessel.

You will see that one cannot at this time make dogmatic statements concerning this method of therapy as applied to heart disease. From what has been presented, however, it seems definite that Blumgart's observations concerning the reciprocal relation of the speed of the circulation and the basal metabolic rate is substantiated and when intelligently applied does bring relief to patients with circulatory failure provided there is sufficient reserve available. The observations also tend to show there is an interrelationship between the adrenal gland and the thyroid gland which plays perhaps a major rôle in the symptom-complex of angina pectoris.

Bibliography

1. Barker, Paul S., Bohning, Anne L., and Wilson, Frank N.: Auricular fibrillation in Graves' disease. Am. Heart Jour., 8:121, 1932.
2. Blumgart, H. L., and Yens, O. C.: The rate of blood flow as determined by a new method. Am. Jour. Physiol., 72:1, 1925. Blumgart, H. L., Gargill, S. L., and Gilligan, D. R.: Studies on the velocity of blood flow: XIV. The circulation in myxedema with a comparison of the velocity of blood flow in myxedema and thyrotoxicosis. Jour. Clin. Investigation, 9:91, 1930. Blumgart, H. L., and Weiss, S.: Studies of the velocity of blood flow: V. The physiological and the pathological significance of the velocity of blood flow. Jour. Clin. Investigation, 4:199, 1927; X. The relation between the velocity of blood flow, the venous pressure and the vital capacity of the lungs in fifty patients with cardiovascular disease compared with similar measurements in fifty normal persons. Ibid.: 5:379, 1928. Blumgart, H. L.: The velocity of blood flow in health and disease: The velocity of blood flow in man and its relation to other measurements of the circulation. Medicine, 10:1, 1931.
3. Blumgart, Herrman L., Levine, Samuel A., and Berlin, David D.: Congestive heart failure and angina pectoris. The therapeutic effect of thyroidectomy on patients without clinical or pathologic evidence of thyroid toxicity. Arch. Int. Med., 51: 866-877, 1933.
4. Coller, Frederick A., and Arn, Roy D. Thyroidectomy for goiter without hyperthyroidism. Postoperative results in adenomatous goiters with normal hypofunction. Western Jour. Surg., Obst. and Gynec., 39:501-506, 1931.
5. Cutler, Elliott C., and Levine, Samuel A.: Surgical methods for the relief of pain in angina pectoris, with especial reference to the value of total thyroidectomy. Proc. Inter-State Post-Graduate Med. Assembly of North America, October, 1933.
6. Cutler, Elliott C., and Schnitker, Max T.: Skin

temperature changes after total thyroidectomy. Proc. Soc. Exper. Biol. and Med., 31:736-739, 1934.

7. Cutler, Elliott C., and Schnitker, Max T.: Total thyroidectomy for angina pectoris. Ann. Surg., 100:578-605, 1934.
8. Groves, Abraham: "All in the Day's Work." The Macmillan Company of Canada, Ltd., 1934.
9. Halsted, William S.: The operative story of goiter. The author's operation. Surgical Papers. The Johns Hopkins Press, Baltimore, 1924, Vol. II, p. 257.
10. Leriche, René: Leçon d'Ouverture, Chaire de Clinique Chirurgicale, Strasbourg, La Presse Medicale, May 16, 1925.
11. Levine, Samuel A., Cutler, Elliott C., and Eppinger, Eugene C.: Thyroidectomy in the treatment of advanced congestive heart failure and angina pectoris. New England J. Med., 209:667-679, 1933.
12. Reid, Mont R.: The treatment of thyroid intoxication. West Virginia Med. Jour., 28:452-470, 1932.
13. Robb, George P., and Weiss, Soma: A method for the measurement of the velocity of the pulmonary and peripheral venous blood flow in man. Am. Heart Jour., 8:650-670, 1933.
14. Shambaugh, Philip: Experimental angina pectoris in the dog, with particular reference to the effect of total thyroidectomy. Proc. Soc. Exper. Biol. and Med., 31:978, 1934. Shambaugh, Philip, and Cutler, Elliott C.: Total thyroidectomy in angina pectoris: an experimental study. Am. Heart Jour., 10:221-229, 1934.
15. Sutton, D. C., and Lueth, H. C.: Pain. Arch. Int. Med., 45:827, 1930.

CEREBRAL VASCULAR CRISES*

E. M. HAMMES, M.D.

Professor of Nervous and Mental Diseases, Medical School, University of Minnesota

Saint Paul

UNTIL recent years it was almost invariably accepted, both by anatomists and physiologists, that there were four fundamental differences between the cerebral blood-vessels and those of the general circulation. These supposed differences were:

1. That many of the blood-vessels penetrating the brain substance were end arteries and did not anastomose.
2. That the pressure in the cerebral circulation was in direct relationship to that in the aorta and the general circulation.
3. That the cerebral arteries and veins were devoid of nerves and vasomotor control.
4. That cerebral arteries were not capable of vasoconstriction, dilatation, or vasomotor spasm as occurs throughout the general circulation.

Clinicians, however, were not in accord with this view, as frequently cerebral syndromes of a transient character manifested themselves which could not be logically explained on an organic basis. Similarly, neurosurgeons from their studies of certain types of epilepsy, both from clinical and operative evidence, were of the opinion that an intracerebral vascular reflex played some rôle in the underlying mechanism producing convulsions.

Pfeifer[8] and Cobb[2] have disproved the old theory of end arteries in the brain. They have demonstrated conclusively that the capillaries of the whole cerebral cortex communicate freely and that there is a general anastomosis between the blood-vessels of the surface and deeper structures of the brain.

Bayliss and Hill and other investigators came to the conclusion that changes in the caliber of the cerebral blood-vessels were determined by changes in the aortic pressure. They based their opinion on the assumption that the cerebral blood-vessels did not have vasomotor nerves or were ineffectual in acting as an independent regulating mechanism. Forbes and Wolff[4] demonstrated significant changes in the diameter of the pial arteries which seemed independent of the systemic blood pressure. Finesinger and Putnam[3] in their experiments on monkeys verified this independence of the vasomotor mechanism from the systemic aortic pressure. With a constant general arterial pressure they observed a definite decrease of cerebral blood volume on cervical sympathetic stimulation and a definite increase during vagus stimulation. Similar results were noted with chemical stimulants. Intracarotid injections of epinephrine resulted in a decrease of cerebral blood volume, with a decrease in the diameter of the pial artery, while caffein or histamin injections produced a definite increase. They believe that the chemical mechanisms controlling cerebral flow are more powerful in causing changes than the vasomotor mechanisms. Huber[5] pointed out that there were nerves of two kinds on the pial blood-vessels: (1) medullated fibers which he considered sensory and (2) nonmedullated fibers which he considered vasomotor. In 1931 Penfield[7] finally demonstrated the continuation of these pial fibers on the cerebral blood-vessels throughout the central nervous system. However, no nerve fibers have been found on the capillaries, which Penfield believes is probably due to the difficulties in dissection and does not mean that such innervation does not exist. Forbes and Wolff[4] have found that the nerve supply of the cerebral vessels is derived from the sympathetic system and that stimulation of the vagus causes dilatation and stimulation of the sympathetic causes constriction of these blood-vessels.

---

*Read at the meeting of the Northern Minnesota Medical Association, September 10, 1934, Brainerd, Minnesota.

These investigations have conclusively demonstrated that the cerebral vasomotor control is closely allied to the general circulation and that the cerebral blood-vessels are subject to similar dilatation, constriction, and vasomotor spasm as occurs in the general circulation. This is of great clinical significance as it explains many of the transient cerebral manifestations that present themselves in the course of constitutional diseases which may be associated with peripheral vasomotor instability.

The diseases in which cerebral vasomotor crises may manifest themselves are: cerebrospinal syphilis, cerebral arteriosclerosis, migraine, some types of epilepsy, Raynaud's disease, cerebral trauma, rarely cerebral neoplasms, angioneurotic edema, and allied disorders. Whether the transient paralysis occurring in uremic states is due to vascular crises or localized cerebral edema is still a moot question. It is very difficult to evaluate the relationship of symptoms to basic pathological disturbance in cerebral vascular spasm, as no evidence of this can be observed at autopsy. The clinical syndrome consists in transient attacks of aphasia, monoplegia, hemiplegia, or sensory disturbance lasting from one-half to twelve hours, with gradual complete restoration of function. However, there is a tendency to recurrence, either in the previously affected area or some other location. With the recurrence of these attacks and as the disease in the affected blood-vessels becomes more pronounced, thrombi may form, resulting in a permanent loss of function of the part involved.

Early recognition of the underlying cause may prevent these recurrent cerebral vascular crises and the resultant permanent disability. This is particularly true in cerebro-spinal syphilis. Spinal fluid studies frequently enable one to discover the etiologic factor and should be made in every case presenting this syndrome. The pupillary reflex changes may be an additional aid in arriving at a proper diagnosis.

In cerebral arteriosclerosis these transient attacks of paralysis occasionally occur as one of the earliest symptoms. Probably some of the epileptic seizures in this group are also on the basis of a vasomotor crisis. Although cerebral arteriosclerosis is a disease of the degenerative period of life, it may occur at any age. Barron[1] reported a case with postmortem findings in a child of thirteen. Schlosser reported a similar case in a child fifteen years old. The youngest patient in our series died at nineteen. A post-mortem examination revealed marked arteriosclerosis of the cerebral blood vessels, especially the Circle of Willis. In a fairly large percentage of these cases the blood pressure remains normal throughout the course of their illness. In Doctor Woltman's[9] series of 146 cases, 64.4 per cent had a mean pressure of 130 mm. systolic and 78 mm. diastolic. Frequently there is no demonstrable clinical evidence of peripheral or general arteriosclerosis. However the retinal blood-vessels manifest sclerotic changes in about one-fifth the cases, which is conclusive evidence of an associated cerebral arteriosclerosis. The spinal fluid is normal. Because of these many negative findings a correct diagnosis is often most difficult and can only be determined by prolonged observation and the development of additional symptoms, such as vertigo, personality changes, evidence of spinal cord involvement, and so forth. In spite of the intrinsically progressive character of the disease the degenerative process may often be indefinitely delayed by general reconstructive and hygienic measures, a carefully regulated life, and avoidance of worry and undue fatigue. Osler[6] reports a case in whom repeated transient attacks of mutism, hemianesthesia, and diplopia occurred on the basis of a cerebral arteriosclerosis and hypertension. Under a careful and restricted regime the patient continued a fairly active life for over eleven years.

In migraine, Raynaud's disease, and the other disorders, the diagnosis can usually be made from the history of the case, the associated symptoms, and the negative sero-biological findings. The following cases are illustrative:

Case 1.—Cerebro-spinal syphilis, with attacks of aphasia and monoplegia developing during the early stage of constitutional syphilis and while under treatment for lues.

A male, aged twenty-two, was referred to our neurological service at the Ancker Hospital by Dr. H. E. Michelson, Minneapolis.

The family and personal histories were negative. Two months previous the patient had developed a "cold sore" on his upper lip which would not heal. Some time later he developed a generalized rash and a sore throat. He reported to the Minneapolis Dispensary. Examination revealed a chancre of the lip, constitutional manifestations of syphilis, and a positive blood Wassermann. He was given the usual antiluetic treatment. During the course of his treatment he suddenly developed an attack of aphasia of several hours' duration. Because he was a St. Paul resident he was referred to the Ancker Hospital.

At the time of admission he appeared perfectly well. His speech was normal, his blood Wassermann had become negative, his spinal fluid was under increased pressure, and showed a cell count of eighteen, a positive globulin, a positive Wassermann, and a syphilitic colloidal gold curve. The neurological examination, including the pupils, was negative throughout.

On the third day at the hospital he had another attack of aphasia of about five hours' duration, which gradually subsided. A few days later he developed a paralysis of the right arm which gradually subsided during the course of twelve hours. Four days later he had a similar attack of about eight hours' duration. The monoplegia was localized to the right arm. The right leg did not become involved, and his speech remained normal. He was placed on prolonged intensive antiluetic treatment with repeated spinal drainage. He made a satisfactory recovery and there were no further clinical manifestations of cerebral vascular spasms.

Comment.—The cerebral vascular crises which caused his aphasia and monoplegia occurred during the early stage of syphilis and in spite of active antiluetic treatment. This early manifestation of central nervous involvement is quite unusual during the secondary period of syphilis. It occurs more frequently in the later stages when cerebro-spinal syphilis is more prevalent and the vascular and degenerative changes more pronounced.

Case 2.—Cerebro-spinal arteriosclerosis with brief attacks of monoplegia, hemiparesis, aphasia, and hemianesthesia, finally terminating in a permanent right hemiplegia with aphasia.

A woman, aged sixty-two, right-handed, was seen in consultation with Dr. W. R. McCarthy, May 27, 1925.

The family and personal histories were essentially negative. At the age of fifty-one she passed through her climacteric without any undue manifestations. At the age of fifty-seven while eating breakfast she developed a weakness of the left side of her face, including the tongue, left arm, and leg. She was not aphasic, but her speech was thick. Within ten minutes the weakness had disappeared. About four hours later she had a recurrence of her paralysis which continued for about thirty minutes and ended in recovery. She remained well for one week, but during the following three days had seven similar attacks, of from ten to forty minutes' duration, involving the entire left side. All symptoms subsided except for easy fatigability until two years later when quite suddenly she developed a right hemianopsia of two hours' duration, which gradually subsided. Six months later while in bed her right arm suddenly became numb and she was unable to determine its position without locating it with her left hand. This subsided after several hours. She remained quite well except for some numbness and "strange feelings of burning and prickling" in both lower extremities. She gradually became somewhat emotional and had occasional crying spells. About two years later she developed a complete right hemiplegia with aphasia, and gradually developed a coarse tremor of the head and right arm. An examination at this time revealed a well nourished woman presenting the usual findings of a right hemiplegia with increased reflexes and a positive Babinski on the right side. She appeared somewhat emotional. The retinal blood-vessels were definitely sclerotic. There was a constant, fine tremor of the head, and irregular jerky movements of the right arm. The peripheral blood-vessels did not present any definite evidence of a general arteriosclerosis, and the heart sounds were normal. The hemoglobin was 82 per cent; blood pressure, systolic 165, diastolic 80; urine, normal. The blood Wassermann and spinal fluid were negative. She progressively grew worse.

Comment.—This patient presents a clinical syndrome of cerebro-spinal arteriosclerosis with recurrent attacks of cerebral vasomotor crises with a terminal hemiplegia secondary to thrombosis.

Case 3.—Migraine with transient attacks of hemianopsia, alexia, monoplegia, and monoanesthesia.

A man, aged twenty-six, right-handed, was seen in consultation with Dr. H. T. Nippert, May 28, 1926. His family history revealed that the mother, aged seventy, had had typical attacks of migraine for forty years, recurring every four to eight weeks, and of six to forty-eight hours' duration. One brother and one sister have severe migraine headaches, and two brothers died of cerebro-spinal syphilis. Two brothers and one sister are well.

The personal history is essentially negative. He uses tobacco and alcohol moderately, denies venereal disease, has a duodenal ulcer and has been on an ulcer diet for eighteen months.

Since the age of three years he has been subject to severe headaches, from three to six a year. The headache would begin with a burning pain behind the eyeballs and gradually extend over one-half of his head (right or left) to the occipital region. It would increase in intensity, was associated with nausea, and would necessitate his going to bed. The headache continued for several hours, and after a night's sleep it would subside. There were no ocular or visual disturbances for twenty-one years.

At the age of twenty-five, after a heavy luncheon and while walking to his office, he developed a right hemianopsia. This continued for about four hours, then he gradually developed a severe unilateral headache, became nauseated, and had emesis. After a night's sleep he awakened and all symptoms had subsided. He had a similar attack of about six hours' duration three months later which was accompanied by numbness and tingling sensations of the right arm.

About six months later, April 24, 1926, he suddenly developed a hemianopsia. This was associated with vertigo, inability to remember the names of his office employees, a slight aphasia, and numbness and ataxia of his right arm. Gradually a severe headache developed. This attack was of about eight hours' duration, after which he entirely recovered.

One week later while writing, his right hand developed numbness and "tingling" sensations; he was unable to grasp the pencil, which fell out of his hand. This continued for an hour, after which he had a similar experience in his left arm, and soon after a severe headache developed. All symptoms gradually subsided as the headache disappeared. In another attack he was able to speak and understand spoken words correctly, but he could not interpret what he read. During one attack he had hemianopsia with a right hemianesthesia. During the months of April and May, 1926, he had several attacks as described above, of variable intensity and from two to eight hours in duration.

The physical and neurological examinations made on May 28 were normal throughout. Dr. H. Rothschild reported that the fields of vision for form and color, and the fundi and retinal blood-vessels were negative.

Studies of the blood, including a Wassermann test, urine, spinal fluid, and spinal fluid pressure were normal. A roentgenogram of the skull was negative. Blood pressure was: Systolic 128, diastolic 80.

He was placed on phenobarbital and calcium lactate. His activities were somewhat restricted, and he definitely improved for four months. On October 10, 1926, he had a recurrence of his migraine with hemianopsia and aphasia. His progress has been quite satisfactory under the regime outlined, his attacks of headache have become less frequent, and the associated symptoms less pronounced. He observed that a large dose of milk of magnesia taken during the prodromal stage would occasionally lessen or abort the attack.

Comment.—It is not uncommon to note a contraction of the retinal blood-vessels during an attack of migraine, and this may have been the basis of his hemianopsia. However, it may have been due to a vasomotor crises of one of the branches of the occipital artery. The aphasia, alexia, and other sensory and motor manifestations are probably on a similar basis, due to a transient spasm of some of the other cerebral blood-vessels.

Case 4.—Raynaud's disease with repeated attacks of blurred vision in the right eye, one transient attack of aphasia with numbness of tongue and right face, transient attacks of monoplegia, right arm, left arm, and left leg, and finally permanent left hemiplegia.

This is the case of a physician, aged fifty, right-handed, practicing in North Dakota.

His father died at the age of fifty-four of a cerebral hemorrhage. His mother died of cardio-renal disease at seventy-four. One brother and one sister are living and well.

His past history is negative. He uses tobacco and alcohol moderately.

Present complaint began about 1914 with occasional blanching of the little finger of the right hand during severe cold weather. No further disturbance was noted until the winter of 1919-20 when repeated typical attacks of Raynaud's disease occurred in all the fingers of both hands. There were no attacks during the summer months. This condition gradually became more pronounced each winter and was accompanied by severe burning pain. In the winter of 1923-24 the toes of both feet became similarly involved. The attacks gradually increased in frequency and severity until the winter of 1927, when he had to retire and move to Florida. In the warm climate the attacks still occurred but were less pronounced.

Examination made in November, 1926, revealed no physical or neurological abnormalities except a slight bluish tinge of the finger tips. All laboratory findings were normal. An examination on November 5, 1929, gave similar findings. During the winter of 1927-28 he would have attacks of blurred vision in his right eye, as if he were looking through ground glass. These attacks were of several hours' duration and occurred at irregular intervals. He estimated that he had about twenty attacks of blurred vision during that winter. The fundi, retinal blood vessels, and the fields of vision were normal at our examination in November, 1929.

In March, 1930, he had his first attack of transient hemiplegia. This began suddenly with numbness, tingling, and weakness of the left arm and left leg, and was accompanied by blurred vision in the right eye. This condition continued for about two hours, then gradually subsided to complete return to normal function. About three weeks later he had a similar involvement of the right upper extremity of about one hour's duration, with recovery. He again consulted us on May 5, 1930, when all examinations and laboratory findings were normal. On May 10, 1930, while in North Dakota on a cold, rainy day he had another transient hemiplegic attack similar to the one in March.

On May 29, 1930, he suddenly became aphasic, and developed a numbness of the tongue and right half of the face. This continued for about one-half hour and then subsided. The summer of 1930 was exceedingly hot in North Dakota and he was free from all attacks until October. During that month he had several attacks in his hands and feet. On November 1 he developed a marked left hemiplegia of twelve hours' duration with gradual complete recovery except that he noted a left ankle clonus with slight weakness of the left leg for about three weeks. He spent a comfortable winter in Florida, and the warm summer of 1931 in North Dakota and the following winter in Florida were uneventful. We examined him on August 19, 1931, without eliciting any pathologic findings.

On August 4, 1932, he developed a sudden weakness of the left arm, left leg and the right arm. The right arm gradually recovered, and the left hemiplegia improved until August 16, when the left hemiplegia became aggravated. We examined him on August 20 when he presented a marked paralysis of the left arm and leg with the usual pathologic reflex changes. This condition has continued with slight improvement to date.

During his entire period of observation from 1926 to September, 1932, repeated laboratory examinations of the urine, blood, and spinal fluid were normal. His blood pressure varied between, systolic 120, diastolic 72, and systolic 106, diastolic 65. Since the hemiplegia has become permanent the vasomotor attacks in his extremities have definitely improved, probably due to his restricted activities and protected environment.

Comment.—This patient developed attacks of vasomotor spasm of his peripheral arteries, gradually involving some of the retinal arteries, and then the cerebral circulation in various regions, to ultimate thrombosis. All of these attacks were evidently on the basis of his Raynaud's Disease.

Case 5.—Undiagnosed case of probable cerebral neoplasm, of transient attacks of monoplegia, upper or lower, limited to left side, one attack of left facial paralysis and dysphagia, two brief periods of unconsciousness.

This patient, a male, right-handed, aged forty-six, consulted us on August 20, 1934.

His family and personal histories were negative except that he smokes excessively, does not use alcohol, and denies venereal disease.

In September, 1933, he developed a paralysis of his left face (central type) associated with "thick speech," difficulty in swallowing, and numbness of the left arm. This condition gradually subsided in forty-eight hours. He remained well until June 16, 1934, when while lying in bed he had a complete paralysis of his left leg, which was of one-half hour's duration. A few days later he had a similar involvement of his left arm. Since then he has had at least fourteen similar attacks limited to either the arm or the leg and of varying duration of three to thirty minutes. In the interval he felt perfectly well. On August 18 he had a short fainting spell with paralysis of the entire left side. The attack was of about five minutes' duration. He recovered completely. Two days later while sitting in a chair he suddenly slumped over to the left and his left arm hung limp. This attack lasted about five minutes. We examined him that afternoon. During his entire illness there were no headaches, nausea, vomiting, vertigo, or visual disturbances. Mentally, he is alert. His bladder and sexual functions are normal.

The physical and neurological examinations were negative throughout except for a very slight weakness of the left facial muscles. Both pupils, fundi, visual fields, other cranial nerves, reflexes, sensation, and so forth, were normal. His hemoglobin was 83 per cent; blood pressure, systolic 155, diastolic 90; urine, normal. Blood Wassermann and Kahn reactions were negative. The spinal fluid was under increased pressure, 20 mm. of mercury, with no evidence of bloc on jugular compression. The spinal fluid was clear, contained six cells, a trace of globulin, gave a negative Wassermann, and a negative colloidal gold curve, and showed a quantitative protein of 10 mg. per 100 c.c. X-ray of the skull was normal. An encephalogram was advised but refused. He was placed on phenobarbital and iodides. He has been free from attacks since August 20, and is still under observation.

Comment.—The only abnormal finding in this case was the increased spinal fluid pressure. Because of this it is our opinion that he probably has a slowly developing neoplasm located over the right Rolandic area and that the attacks are either due to cortical irritation or localized vascular crises. However, one cannot exclude an early cerebral arteriosclerosis. Further development of symptoms or encephalographic studies will enable one to arrive at a definite diagnosis. This case illustrates the difficult diagnostic problems one encounters in this type of a syndrome.

Summary

1. A brief review is given of the recent investigations made on vasomotor nerve supply and vasomotor control of the cerebral blood-vessels.

2. It has been definitely shown that cerebral blood-vessels have a nerve supply similar to that

of the general circulation and are subject to dilatation, contraction, and vasomotor spasm.

3. Clinical cases illustrating these various disorders are reported.

1125 Lowry Medical Arts Bldg.

References

1. Barron, Moses: Discussion of Dr. H. W. Holtman's paper. Minn. Med., 5:106, (Feb.) 1922.
2. Cobb, Stanley: The cerebral circulation. Arch. Neurol. and Psychiat. 25:273, (Feb.) 1931.
3. Finesinger, J., and Putnam, T. J.; Cerebral circulation. Arch. Neurol. and Psychiat., 30:775, (Oct.) 1933.
4. Forbes, H. E., and Wolff, H.: Cerebral circulation. Arch. Neurol. and Psychiat., 19:1057, (June) 1928
5. Huber, G. Carl: Observations on the innervation of the intracranial vessels. Jour. Comp. Neurol., 9:1, 1899.
6. Osler, William: Transient attacks of aphasia and paralysis in states of high blood pressure and arteriosclerosis. Canad. Med. Assn. Jour., 1:10, (Oct.) 1911.
7. Penfield, Wilder: Intracerebral vascular nerves. Arch. Neuro. and Psychiat., 27:32, (Jan.) 1932.
8. Pfeifer, R. A.: Grundlegende Untersuchungen für die Angioarchitektonik des Menschlichen Gehirns. Berlin, Julius Springer, 1930.
9. Woltman, H. W.: Cerebrospinal arteriosclerosis. Minn. Med., 5:102, (Feb.) 1922.

THE AMBULANT TREATMENT OF HERNIA*

A. F. BRATRUD, M.D.

Minneapolis

SO much has been written on the subject of hernia that it seems as though the last word has been said. Yet when an analysis is made of statistics as to cure, there is a difference in results that vary anywhere from 1 to 20 per cent. A recent article by Bissel and Andrews states that the results in operations on direct hernias are so bad as to constitute a major surgical scandal, and further states that when one considers that the recurrences are far more dangerous than the original hernias, it seems high time that the subject was thoroughly reconsidered. Interest has been manifested at various times in regard to the ambulant treatment of hernia, but it has never become popular. As early as 1880, Billroth made the statement that if anyone could obtain a solution that would cause the artificial proliferation of tissue, the radical operations for hernia would be obviated. It is my object here to present opinions and impressions with results to date, gained from experience with the ambulant treatment of hernia, during the past three years.

We used various solutions in experimental work on dogs and rabbits, as well as in practical application to patients. Before treating any patients, colored novocain solution was used to inject the internal inguinal ring, and it was surprising to note how this solution could be deposited around the internal inguinal ring with the technic to be described. The first solution that was used consisted of Phenol 50 parts, Alcohol 25 parts, Lloyds Specific Tincture of Thuja 25 parts. This should stand for at least forty-eight hours and then either be decanted or filtered. Pina Mestre solutions were used. Injection of rabbits with Pina Mestre solution put up by a drug firm according to the formula, produced necrosis and was not used clinically. With the original Pina Mestre solution there was a marked proliferation of tissue with foreign body giant cells. Then a solution consisting of a distillate of the tinctures of several botanical herbs was used. To this was added .1 per cent tannic acid and .5 per cent thymol. This was the original Proliferol, which has since been modified at my suggestion. This produced a picture which could not be distinguished from the area injected with the Pina Mestre solution. A number of dogs were injected using Fluidextract Pinus Canadensis in alcohol and phenol, in strengths of 1, 3 and 10 per cent. These are the basic drugs in Mayer's solution. These produced necrosis, abscess, and, in one dog, peritonitis and death. Pina Mestre solution consists of a group of tinctures which do not have a standardized strength of tannic acid, two of the drugs not belonging to the United States Pharmacopœia. Several different strengths of a tannic acid preparation were used, the strength varying from 0.5 per cent up to 5 per cent. On account of the burning that results from the injection of a tannic acid preparation, various local anesthetics, novocain, nupercain and benzyl alcohol were used. This did away with the burning pain, but a large percentage of these patients would have symptoms of an acute coryza on the following day. This did not occur in all cases, but did in so many that it had to be discontinued. This was thought to be due to the fact that it did not exist in colloidal form in the synthetic preparation and was more rapidly absorbed, thus causing toxic symptoms.

---

*Read before the annual meeting of the Minnesota State Medical Association, Duluth, July, 1934.

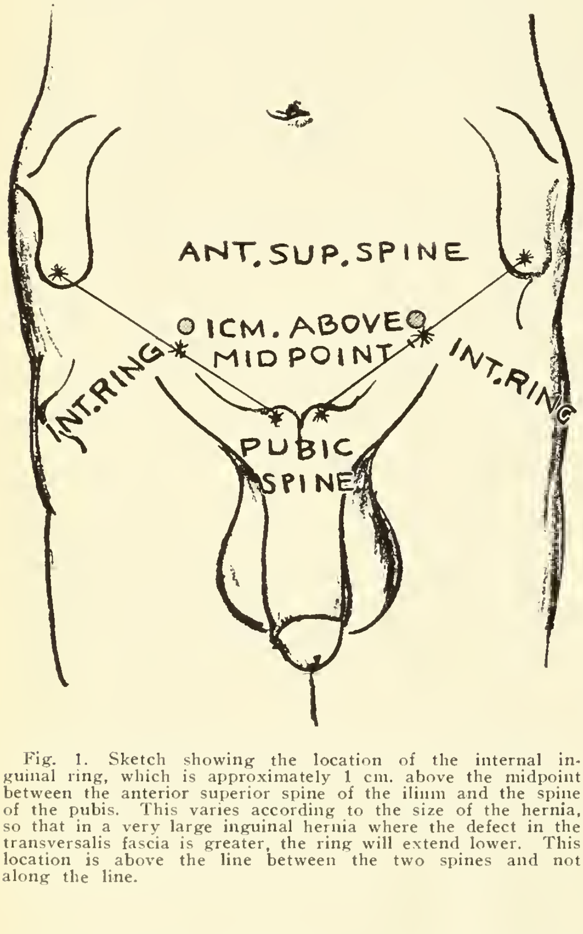


Fig. 1. Sketch showing the location of the internal inguinal ring, which is approximately 1 cm. above the midpoint between the anterior superior spine of the ilium and the spine of the pubis. This varies according to the size of the hernia, so that in a very large inguinal hernia where the defect in the transversalis fascia is greater, the ring will extend lower. This location is above the line between the two spines and not along the line.

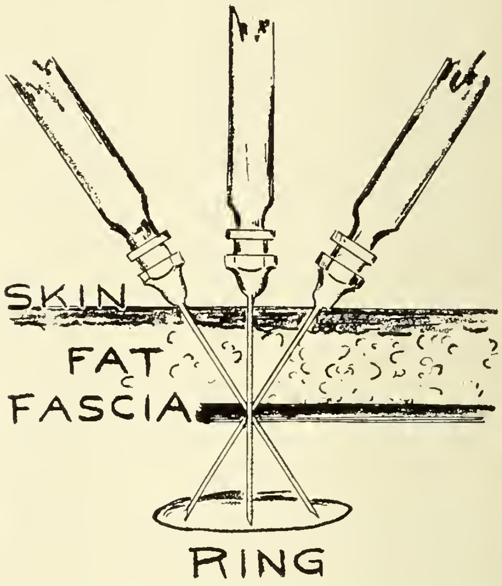


Fig. 2. Sketch showing the injection of the internal inguinal ring. The needle is introduced directly through the skin, fat and fascia of the external oblique muscle. As the needle penetrates the fascia, there is a distinct "give" feeling. Very little experience is needed to determine this location. As the needle is introduced slightly further, depending upon the thickness of the abdominal wall, it will approach the region of the internal inguinal ring. When the needle is in the proper location, the syringe can be rotated in a circle, thus giving free rotation of the tip of the needle. This can be very easily demonstrated by the injection of colored novocain solution, preparatory to operating upon a hernia.

Microscopic report of specimens after injection shows a marked proliferation of fibroblasts with these dipping down between the muscle fibres. This, according to Dr. Bell, produces a binding effect, as he expressed it. There was no infiltration of polymorphonuclear cells or any evidence of necrosis, except in the rabbits injected with Pina Mestre solution put up according to formula by a pharmacist. Here fifteen minims was injected at weekly intervals and at the end of six weeks there was necrosis present with marked infiltration of polymorphonuclear cells and lymphocytes. No giant cells were found. Sections where a tannic acid preparation was used showed a denser fibrosis than sections with the Thuja mixture. Injection close to the peritoneum or just within the peritoneal cavity showed no evidence of abscess or necrosis, but a similar picture. The omentum was adherent to the abdominal wall, and there was so much proliferation of fibrous tissue as to completely obliterate the peritoneum. Results of injection below the fascia of dogs and rabbits showed a marked proliferation of fascia fibres with no evidence of necrosis. There was no necrosis or infiltration of polymorphonuclear cells. Injection into the peritoneal cavity shows no evidence of abscess, but a similar picture. The omentum was adherent to the abdominal wall, and several loops of intestine were matted together. There was no evidence of necrosis present. Sections from dogs injected with the original Pina Mestre, as well as the distillate of the drugs contained in the formula, showed a reaction which could hardly be differentiated one from the other except that the section from the original Pina Mestre solution showed better developed foreign body giant cells. There was no infiltration of P.M.N. cells or necrosis in these specimens.

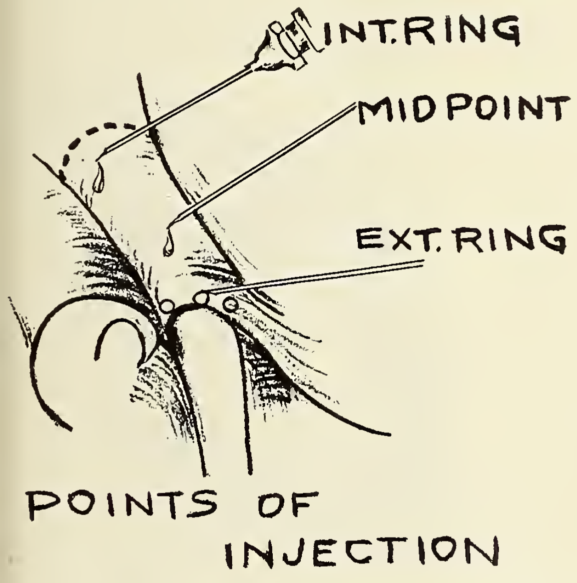


Fig. 3. Sketch showing various points for the injection along the inguinal canal. The solution should always be deposited below the fascia and not superficial to the fascia. Several points should be injected, as per sketch, at the external ring. The needle point should be within the external ring so that none of the solution filtrates into the subcutaneous fat, as, when this happens, there will be a hard nodule present. The needle should not go so deep as to injure the cord.

There are several contraindications to this method. All types of hernias are not amenable to this type of treatment. Postoperative or incisional hernias usually have adhesions or incarcerated abdominal viscera and no definite sac and should not, as a rule, be so treated. Incisional hernias usually have one hernia that can be diagnosed, but have several potential hernias along the line of the incision. When there has been a very small incision, a definite opening can be determined, and the contents can be reduced and held reduced by a properly fitting truss. This hernia can be so treated.

Hernia associated with an undescended testicle, incarcerated or irreducible hernias should not be injected on account of the danger of strangulation. These are distinct surgical conditions. Hernias that can be reduced, but where the symptoms cannot be completely relieved by proper application of a truss, are surgical. Sliding hernias should not be treated by injection. It is very doubtful whether a sliding hernia can be held reduced by a truss. To begin with, I was skeptical about treating direct hernias, but it seems as though the results of injection in direct hernias are just as good as in the indirect inguinal type. Any general surgical contraindication, such as hyperthyroidism and hemophilia, should always be considered a contraindication. Laying aside the contraindications we may state that any inguinal hernia can be treated provided it is reducible and can be held reduced by a properly fitting truss, and provided there are no surgical contraindications, as mentioned above. Although a few femoral hernias have been treated with good results, I believe that, especially in large hernias, complications are liable to occur. Several epigastric hernias have been treated with good results. At the outset no umbilical hernias were treated, but, with improved truss pads, it was found they can be treated.

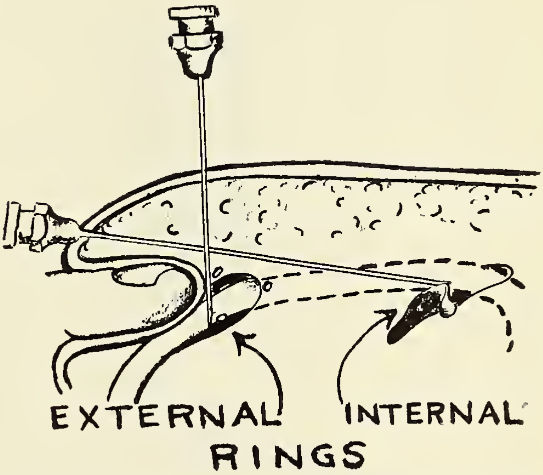


Fig. 4. The internal ring can also be injected by introducing a 3 inch needle through the external ring, and passing it forward along the inguinal canal to the region of the internal inguinal ring. After passing the external ring it is carried forward to about 1½ to 1⅞ inches. There is, however, more danger of injuring the cord with this technic.

Femoral Hernias

Femoral hernias can be injected very easily by placing the tip of the finger in the femoral canal, and then injecting the solution immediately below the tip of the finger. Not over two or three drops should be injected at one time in femoral hernias. As a rule not over three or four injections are necessary to obliterate a femoral hernia.

To begin this work, it is absolutely necessary to know how to fit a truss so as to hold the hernia reduced. The pad of the truss should fit over the inguinal ring so as to hold the hernial contents within the abdomen. One type of truss will not fit all individuals. The best truss that I have yet found is a spring type. When properly

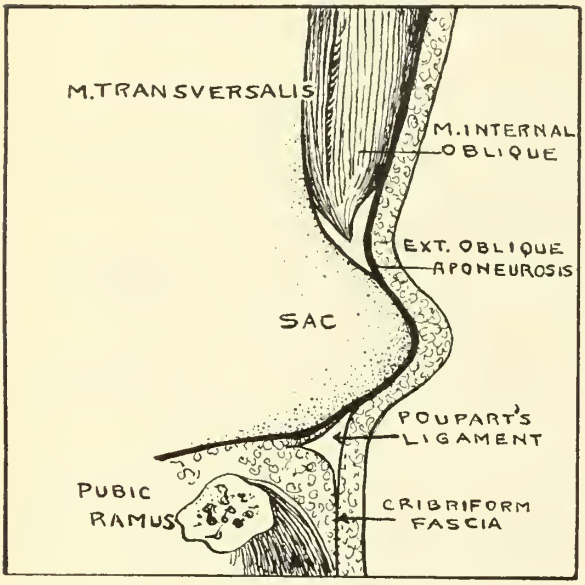


Fig. 5. Sections showing pathologic changes due to a direct hernia. This is not a true hernia in the true sense of the word, but a weakness of the abdominal wall in the inguinal region. It is impossible to get a strangulation of a hernia of this type.

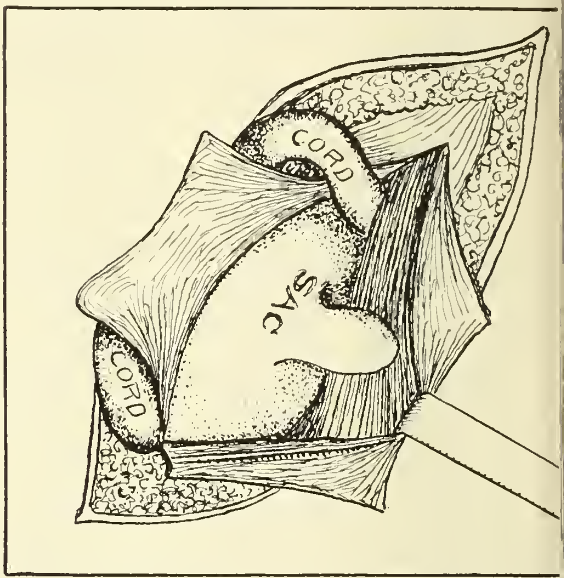


Fig. 6. Diverticulum in a direct hernia shows the sac pushing through the weakened abdominal wall in Hesselbach's triangle. This is the type of hernia which will strangulate.

fitted, the patient can engage in almost any form of exercise or work he desires. Trusses are usually fitted low, and very often give relief, but when so fitted they do not hold the hernia reduced except in direct hernias. If improperly fitted they cause the hernial contents to press outward against the fascia of the external oblique and result in a fraying or thinning out of the fascia as well as an enlargement of the defect in the transversalis fascia. The spring type of truss is not always suitable for a patient with the rounded or feminine type of hips. Here an ordinary elastic type of truss is satisfactory. The requirements are that the truss stay where it is put, keep the hernia retained by a constant firm and continuous pressure and prevent protrusion of any abdominal contents. It is necessary to watch patients regularly to see that the truss fits, as a perfect fitting truss today may be worthless if a patient loses any great amount of weight. The measurement for the spring type of truss is taken about 2 cm. below the crest of the ilium and bringing the end of the tape down to the symphysis pubis. Coöperation on the part of the patient in wearing a truss is absolutely essential; otherwise failure is the result. Several patients have been successfully fitted with a truss, and treated only after having the patien on a reducing diet and thus reducing the intra abdominal pressure. Large scrotal hernias ca often be held reduced after having a patient i bed for several days with the foot of the bed elevated, and then treating the patient daily for three days to a week. For umbilical hernias, the best form of a truss is a hard pad which fits into the depression and is held in place with an elastic binder wrapped around the body several times. This is a definite improvement over any previous truss or binder used for this type of hernia.

The objections which have been mentioned to injection treatment should be considered. Paraffin injections can be dismissed without further discussion, for it is a well established fact that the method has resulted in very few permanent cures. It causes irritation from the presence of a foreign body and generally requires surgical interference for its removal and the closure of the hernia. The fact that it has been only in the hands of quacks is not a good argument, for it is not so many years ago that reputable medical men were severely criticized for the injection of hemorrhoids or varicose veins, procedures which today are accepted. The so-called Timmerman treatment with alcohol injection should be disarded on account of the large number of inections required, and the numerous resulting omplications. The claim that irritating soluions cause discomfort and pain sufficient to cause patients to be incapacitated, has not been substantiated. It is true that some patients will have a greater reaction than others, but very few suffer sufficiently to incapacitate them from heavy work. Another objection is that a truss must be worn for a long period of time. A properly fitting truss is of no more inconvenience, after the first few days, than a well fitting glove. I think it can be safely stated that 30 per cent of all individuals suffering from hernia are wearing trusses at the present time, and that only one out of ten trusses holds the hernia reduced. It has been stated that injection is a blind and not a rational procedure. To this I may reply that there is a definite technic and, unless this is learned, great harm may result.

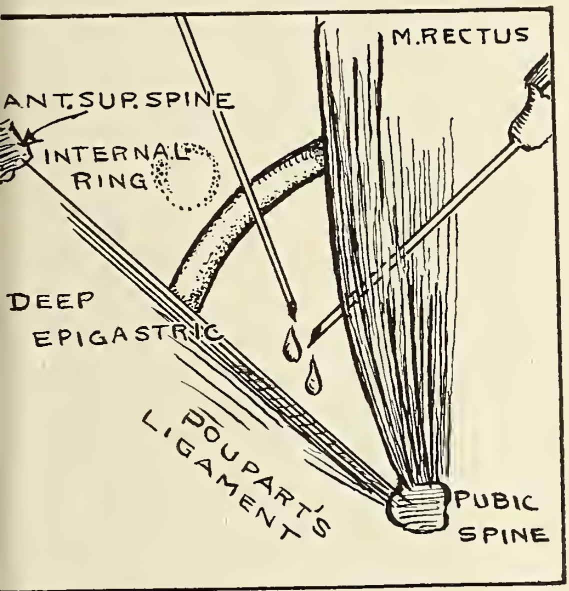


Fig. 7. The technic for the injection of Hesselbach's tringle. In the case of direct hernias the needle can be slid along the outer edge of the rectus abdominis muscle or can be entered into the triangle lateral to the rectus abdominis from above. In this manner the triangle can be injected without injury to the cord.

A number of complications attending injections such as hydrocele, epididymitis, sepsis, strangulation, sterility, peritonitis and abscess have been mentioned. There has been swelling of the cord in a few cases, and this has usually occurred toward the end of the treatment, but has caused no serious disability. Only rarely can fluid be aspirated from a hydrocele of the cord, but this will be absorbed and is not serious. Only an occasional patient will suffer sufficient reaction to incapacitate him, and this usually lasts only one or two days. There has been no atrophy of the testicles noted to date. Whether this may prove a later complication and result in sterility cannot be determined until after a lapse of years. It is surprising how many cases of atrophy of one or both testicles were found among these patients when first examined.

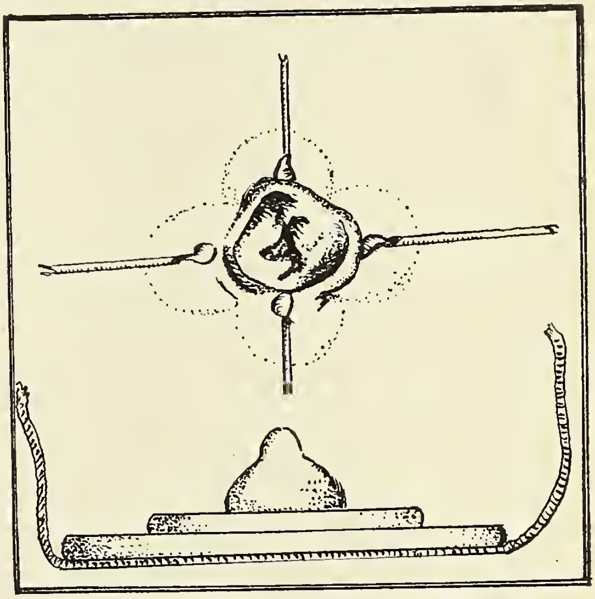


Fig. 8. Method of injection of umbilical hernias. Novocain should first be used as injected in inguinal hernias, only in a smaller quantity. Not over 1 to 1.5 c.c. should be injected at a time at various sides of the hernia. The needle should reach down to the edge of the fascia.

Cross section of an umbilical pad showing cone shaped truss pad which fits into the hernia opening and then two pads which support this. After this pad is put in place, it is held in place by an elastic bandage wrapped around the abdomen several times.

I wish to mention two patients who had hydroceles with their hernias. At the beginning of treatment, the fluid would gravitate into the abdomen when lying down. Both these patients had a 50 per cent atrophy of the testicles when first seen. After treatment, there was no recurrence of the hydrocele and one of these patients, when last seen, showed a testicle 75 per cent the normal size. Another argument is that as a result of injection there is not a strong abdominal wall. A number of treated patients have developed hernias on the healthy side after cure was effected on the diseased side. The time elapsed since commencing this treatment is however too short as yet to warrant any final conclusions on this point. One patient who was treated and died about a year later of an attack of influenza, at autopsy showed a perfect closure of the internal ring and a finger could not be forced through this region.

Fraser and Hall, at Bellevue Hospital and New York University, injected a few hernia cases in 1929, and carried out experimental work on monkeys and dogs. For this they used the Pina Mestre solution. Their results showed a swelling and edema in ten days. Examination of the indurated areas showed a vigorous proliferation of endothelial and connective tissue cells, plus large mononuclear phagocytes and foreign body giant cells. Two specimens showed a trace of the injected substance in the abdominal muscle of the monkey and the omentum of the dog. Two sections of the tissues from the monkey showed an extensive mechanical rupture and necrosis of the muscle fibres. There were masses of yellow granules engulfed by large multinuclear giant cells. Marked proliferation of fibroblasts with some lymphocytes and plasma cells was also shown. There were a few areas of multinucleated regenerating muscle cells and single myelocytes. The omentum showed reddish granules and multinucleated giant cells, some single reticular cells and marked proliferation of fibroblasts.

In patients treated by injection an induration in the region of the injection follows. This is usually tender to pressure on the day following treatment. Hot packs relieve the pain when present. In very few cases was this of such severity as to incapacitate the patient. Usually after two to four treatments there is sufficient exudate or plastic tissue formation to prevent protrusion of the viscera. The external ring shrinks in size and the fascia can be felt to thicken, so that at the end of a few weeks the external ring will not admit the tip of the index finger. This usually begins after two injections at the external ring. There has been no infection in any case. When a tannic acid mixture was used the patients would occasionally complain of general malaise or a feeling as though they had a cold, on the following day. Practically all patients mention the great relief obtained as soon as they are fitted with a truss and have had two or three treatments. There is less soreness and pain from the distillate Proliferol or from the original Pina Mestre solution, and these seem to give quicker results than any of the other solutions. The technic is different than with the other solutions.

There are several advantages to this form of treatment, the principal one being that it is ambulatory and that the patient continues working, is not confined to the hospital for a period of two weeks, and is not incapacitated for another period of four to eight weeks. There is no question but that the economical issue is of great importance at the present time. There is no question but that the recurrence of hernia following operation is much greater than statistics show, for hernias will recur as long as fifteen to eighteen years after the operation, and it is most difficult to obtain an accurate check of recurrences. I do not believe that the recurrences will be as high following this type of treatment as it is following operation, and especially if the patients are watched every two months for a period of two years. A number of postoperative patients who began to show weakening and a beginning recurrence, were fitted with trusses and treated, and a recurrence of the hernia was prevented. I believe that the recurrence of hernia following operation can be practically done away with, provided the patients are fitted with a truss and compelled to wear it for a period of time after operation.

The technic is not difficult when the anatomy of the parts is known. After the patient has been fitted with a truss, and this has been worn for a period of several days to several weeks so as to be certain that it fits and holds the hernial contents reduced, treatment can be started.

The formulas for solutions which we have been using to date are as follows:

Thuja Mixture

Phenol	50 parts
Alcohol	25 parts
Lloyds Specific Tincture of Thuja	25 parts

Allow to stand two days and then either decant or filter.

Zinc Sulphate Solution

Zinc Sulphate	1 dr.
Phenol Crystals	6 dr.
Glycerin	4 fl. dr.
Aq. Cinnamomi	1 fl. oz.
Fld. Extr. Pinus Canadensis (dark)	5 fl. dr.
Sterilized chemically pure redistilled water	2 fl. oz.

Dissolve the zinc sulphate in the cinnamon water. Liquefy the phenol crystals by heating. Add the glycerin. Shake thoroughly until mixed and cooled; then add the distilled water and finally the fluid extract of pinus canadensis. Shake thoroughly. Allow the fluid to stand for about a week, agitating the mixture several times a day. Subsequently it should be filtered. Before injecting, boil the solution in a glass tube.

Pina Mestre solution consists of several vegetable tinctures, the basic drug being tannic acid.

Proliferol solution consists of a distillate from the tinctures of several botanical herbs to which is added thymol, tannic acid and benzyl alcohol.

When using the Thuja mixture or Mayers solution, two to five drops are injected at the internal ring as described in the accompanying sketch. Injections are made about twice a week, depending upon the reaction of the individual. Should there be much reaction then the periods between the injections are lengthened. After several injections in the internal ring there is usually sufficient plastic exudate to prevent herniation, even when the truss is removed. After beginning treatment the patients are advised to wear the truss day and night for at least thirty days, or until such time as we are certain that there is sufficient organization to hold the hernial contents within the abdomen. Injections are also given at several points along the hernia canal, just beneath the fascia. Injections are also given just inside the external ring and also in Hesselbach's triangle. For the injection of Hesselbach's triangle, the needle is introduced mesial to and posterior to the cord, depositing the solution upon the conjoined tendon or the transversalis fascia.

The type of syringe most satisfactory is the ordinary insulin or tuberculin syringe with a twenty-two gauge needle. For the Pina Mestre solution a 5 c.c. syringe is the best.

Usually up to eight drops of the Thuja solution can be injected, whereas two to six drops of the Zinc Sulphate solution is usually sufficient. The number of injections required to close the hernia varies. A few patients have received only four treatments, and have obtained good result. As many as twenty injections have been given to cases of large scrotal hernia. It is much better to give more than the minimal number of treatments and be sure of a good closure.

With the Pina Mestre solution or the distillate (so-called Proliferol), the treatment is started at the external ring. First a site on the mesial side of the external ring is injected. Then injections are given on the lateral border of the external ring, after which two injections are given in the lateral and mesial borders of the internal inguinal ring. Then several injections are given along the course of the inguinal canal. Two c.c. of 2 per cent novocain solution without adrenalin is first injected just below the external oblique fascia. The needle is then left in situ and after three to five minutes the injection of the solution is made. A quantity of 3 to 5 c.c. can be injected at a time. It is preferable to treat these patients every other day or twice weekly, although they can be treated daily with good results. There is much less after-pain or soreness with these solutions than with the other solutions. The treatment should be continued until the entire inguinal canal is filled with a plastic exudate which becomes indurated and hard, and until no impulse on coughing is present. It is not advisable to have the patient strain and cough until it is fairly certain that the hernia is obliterated. Occasionally there will be swelling of the cord, but this does not contraindicate treatment at that time. The swelling always subsides in a few weeks. In direct hernias the region of the internal inguinal ring should be injected to guard against development of an indirect hernia.

At the time of our most recent check there have been under treatment 406 hernias in 387 patients. A very small number of these have been only fitted with trusses because of their advanced age or feebleness. The recurrences to date run a little less than 4 per cent. This includes indirect inguinal, direct inguinal, femoral and epigastric types. There has been difficulty in closing the hernia in a few instances, but in only three cases have we been unable to effect a complete closure. These were cases in which there was extreme difficulty in holding the hernias reduced that were injected against our first advice. One case was that of a man who was referred for operation. He had developed a direct hernia after the closure of an indirect inguinal hernia. In this case we did not diagnose the direct hernia.

The following instructions are given to every patient:

1. The truss should be worn next to the body, removed in bed, and put on in bed.

2. All patients should wear their truss night and day for a month after treatment is finished.

3. If the truss does not stay in position, a strap fastened in front and back will hold it in place.

4. The pressure of the pad should produce a depression in the skin.

5. If the hernia becomes painful or if you are distressed by wearing the truss, report to the clinic for examination.

6. The hernia must be held back at all times by the truss.

7. You will be able to continue your regular occupation, but if you do any heavy lifting, see that the truss is in proper position.

8. The number of injections varies from eight to sixteen.

9. The truss should be worn six months after the last injection.

10. At the end of this period return for check-up.

11. It is also well that you report for examination every two months for about two years.

12. If at any time a recurrence develops, we would appreciate it if you would return for examination, or notify us to that effect.

Conclusions

1. Injection is a safe and effective method of eradicating certain types of hernias, if proper technic is used, but there is danger of complications if details are not adhered to.

2. It demands the coöperation of the patient in the proper wearing of the truss.

3. Knowledge of the fitting of trusses and the technic of the injection is absolutely essential.

4. Recurrence of hernia can very nearly be done away with by combined form of treatment.

5. Patients who are incapacitated and have a definite surgical contraindication can be so much relieved as to enable them to pursue a gainful occupation, and in many cases a cure can be effected.

6. Complications as mentioned above have not been encountered to date in clinical cases.

7. This treatment brings the mechanical treatment of hernias, where necessary, from the hands of those who know little or nothing of diagnosis, pathology and anatomy, into the hands of physicians who should know this form of treatment.

Discussion

Dr. James C. Masson, Rochester, Minn.: I am sure that we have all been much interested in Dr. Bratrud's presentation of this subject. I think he should be congratulated for bringing before the medical profession a method which, although known for a long time, has been done satisfactorily by only a few men.

There is no doubt in my mind that the most important element in this type of treatment is proper training. We all know the difficulties some men, even those who are doing a good deal of surgery, have in attempting to put a needle into the vein for transfusion or other intravenous medication, whereas trained technicians or internes who are accustomed to such work rarely have trouble. I am sure that one who only occasionally tries to inject a hernia is likely to have trouble, and bad or even dangerous results would be likely to follow some of the solution getting into the peritoneal cavity or into the cord structures. Time will tell, of course, just how extensively this treatment will be used, and Dr. Bratrud has made a definite attempt to demonstrate its value. A few papers on the subject have been published before, but they have not been well received by the medical profession.

We must not be too critical of this method, because we should remember that until a few years ago hemorrhoids and varicose veins were looked upon as surgical conditions, and their treatment by injection was considered a method to be used only by quacks, yet at the present time its value in this field is recognized by the medical profession and the procedure is being used extensively.

There is no doubt that certain indirect inguinal hernias can be cured by this method. Personally, I have had no experience, but after hearing Dr. Bratrud's paper, seeing his demonstrations at this meeting, and noting the enthusiasm of Dr. F. L. Smith, who is in charge of the injection of veins and occasionally injects hernias at The Mayo Clinic, I feel that the method is sometimes justifiable. We must not lose sight of the fact, however, that the great majority of hernias to which this type of treatment is applicable, namely, the reducible type of indirect inguinal hernias, are those in which good results can be expected from ordinary surgical methods. The size of the hernia, provided it is reducible, does not make much difference. The types of hernias that are difficult to cure by surgical methods are the types in which this method would not be indicated, and my experience in recent years with live sutures made from strips of fascia lata has made me feel that surgery is by all means the safest and best method of repairing such hernias. There is no doubt that the percentage of recurrences following surgical operations is much higher than the medical profession as a whole realizes, and the most important reason for this is probably that many operations for hernia are done by men with little surgical experience. Furthermore, when foreign suture material is used in the closure of large hernias, especially those of the direct type in elderly people, in which considerable tension is necessary to bring the tissues together, the sutures frequently cut through, leaving a wide open inguinal canal. I am satisfied that if the injection method is ever used extensively a great many recurrences will follow.

Frequently, we see patients who have been told that they had a hernia, but who have just a slight bulging or suggestion of a direct hernia, and I do not feel that operation is indicated. It is also true that many patients with a congenital, indirect, inguinal, hernial sac never have any bulging because the muscles at the level of the internal abdominal ring keep the neck of the sac securely closed, and I do not advise exploration of the inguinal canal unless I am able definitely to demonstrate a hernia. I am satisfied that occasionally patients are operated on for inguinal hernia when none exists, and I am sure that a great many patients have been treated by the injection method by quacks when no hernia existed.

The fact that patients are ambulatory during the course of treatment will make this method popular in many localities but in the clinic in which I work, extensive use of this method would result in little saving of time or expense to the patient.

There is no doubt that this method is relatively safe in the hands of men who have had extensive experience, but if the method ever becomes popular, I am inclined to think that many accidents will happen, because injection of a small amount of the fluid into the cord will cause definite injury and in many cases cause atrophy of the testicle. In older patients this is not a serious consideration; in fact, in repairing hernias in elderly men I think it is a good plan to remove the testicle and cord. If this is done, closure of the inguinal canal is a simple and satisfactory procedure, especially if live sutures are used.

I cannot agree with Dr. Bratrud on the advisability of this type of treatment in femoral or epigastric hernias. In the great majority of femoral hernias, the protrusion felt is a large preperitoneal fat tag with a very small hernial sac inside, and it is seldom that any abdominal viscus enters this sac. If it does, strangulation is apt to occur.

If the crural canal is blocked by fibrosis following injection, a palpable mass will remain just below the crural canal, and, even if there is no danger of strangulation, the patient will have some discomfort and will still think that he has a hernia. The same thing is true in cases of epigastric hernias. In the majority of such cases, there is no peritoneal sac. The protruding mass is merely preperitoneal fat, and the discomfort is caused by traction on small sensory nerves that accompany it. The surgical cure of this condition is accomplished so easily and satisfactorily under local anesthesia with little hospitalization of the patient that I consider any other method of treatment unwarranted.

Dr. Bratrud said that the fitting of trusses is an important matter. It is most unfortunate that the fitting of trusses has been more often in the hands of quacks and drug-store clerks than of physicians. When most of us went to medical school, there was no instruction whatever in the fitting of trusses, but I am glad to know that the University of Minnesota and some of the other universities in this country are instructing students in the proper fitting of trusses. This, I feel, is a real step in advance, as I am sure that a great many patients without actual hernia are wearing trusses at the present time, and that many who have hernias are wearing ill-fitting, cumbersome trusses that furnish little protection against strangulation.

With regard to reduction of weight in stout patients, putting them in bed and reducing them is going to take time. If the patient is a good surgical risk, even if he is overweight, I seldom have him reduce. I have operated on several patients who weighed over 250 pounds, and there is no reason why they should not have their hernias operated on. Perhaps the reduction in weight advised in these cases, in order to make palpation of the internal ring and cord structures easier, is going to take about as much time as operation.

Dr. Bratrud referred to the necessity of thorough coöperation on the part of the patient. I feel that this is just as important in cases following operation as it is after injection, for I have had some unfortunate experiences. At the present time I have among my patients a man who got out of bed three days after operation because of a slight disagreement with his nurse. I can recall another patient, a man on whom I had operated for a large hernia, who got drunk and engaged in a fight the second night after leaving the hospital. I do not know whether he had a recurrence or not. Violent exercise of that kind should be avoided for at least three months.

Dr. Bratrud mentioned the danger of getting some of the solution into the peritoneal cavity. I feel that there is more danger of this at the hands of beginners or amateurs than his remarks would indicate. In his hands there is probably not much danger, but pain cannot be relied on as a warning that the peritoneum has been reached because if the novocain has also reached that deep, there would be no pain, and injury to the bowel or sufficient irritation of the peritoneum to cause firm adhesions might result.

There is no doubt that this method is going to be tried out extensively in the near future, but I think it should be in the hands of specialists and that only suitable cases should be treated. I am sure we shall all be interested in the statistics after a sufficient number of cases has been treated by this method.

Dr. Carl O. Rice, Minneapolis: The histopathologic changes which take place in the tissues, after the injection treatment of hernia, have been found to be such that it seems justifiable to proclaim the efficacy of the method on this basis as well as on the results of clinical trial.

The unpublished work performed by Dr. Bratrud, on the dog, has demonstrated very clearly that dense white nonelastic fibrous tissue is formed after the injection of the solution into the abdominal wall. More recently Dr. Hamline Mattson and I have obtained biopsies from patients who have been operated upon for the cure of their herniæ after having submitted to one or two injections at varying intervals before the operation was performed. In brief, our investigation has shown that the reaction which takes place is that of fibrous tissue proliferation from its early stages, in which the major portion of the tissue consists of young fibroblasts, to the mature stage when all the fibroblastic tissue has been converted into dense nonelastic fibrous tissue. The reaction from one injection extends over an area approximately two centimeters in diameter. When the solution is placed in the inguinal canal, deep to the fascia of the external oblique muscle, it is found that fibrous tissue is produced so that the cremaster muscle and spermatic fascia below become densely adherent to the fascia of the external oblique muscle above. This aids in constricting the inguinal canal. Instead of being easily dissected, as can be done in an uncomplicated hernia operation, the loose areolar tissue in the inguinal canal and between the fascial planes is replaced by dense fibrous tissue.

Conceivably, then, if it is possible to produce fibrous tissue where it is desired the same end-results should be obtained as with the operation, with the exception of being able to remove the hernial sac. We know, from postmortem examinations, that there are many individuals whose hernial sac extends down into the cord but who have never realized that they suffer from rupture. These were individuals in which the opening into the sac was so constricted that no contents ever entered the sac and therefore never caused symptoms. It therefore becomes our problem to produce a similar situation by the injection treatment. That, as a matter of fact, is exactly what we do accomplish.

For example I may cite a case which, through our error, will clarify the technic and likewise demonstrate the results which may be obtained if the technic is not properly carried out: A man, aged 50, had a large bilateral indirect inguinal hernia with contents in the scrotum making it so large that the entire mass measured about 20 centimeters in diameter. He had received thirty injections on each side over a period of one year. Although the herniæ had been reduced considerably in size and could not be made to extend more than three or four centimeters beyond the external ring we were unable to completely close them and decided to operate upon this patient. At the time of operation dense fibrous tissue was found under the fascia of the external oblique muscle, adherent to the cremaster muscle and spermatic fascia of the cord. This tissue was tough and could be dissected out only with difficulty. It gave the appearance of a hernia which had been operated upon previously. At the internal ring the fascia and scar tissue extending from the cord was spread out fan-wise to become continuous with the internal oblique muscle, thereby keeping the internal ring open at its point of exit from the peritoneal cavity. It was clearly evident in this case that we had gotten no results because the injections were placed superficial to the internal oblique muscle at the internal ring instead of deep to this structure where the hernial sac dips down to become continuous with the peritoneal cavity.

The nature of the condition which Dr. Bratrud has spoken of as induration of the cord for a time could not be fully explained. After having seen a number of these sequelæ and having observed that following this reaction the sac became obliterated in most instances, it was decided to insert an aspirating needle into this mass. After passing through three or four millimeters of tough indurated tissue the needle dropped into a space from which yellow transparent fluid was obtained. This fluid appeared similar to what is found in a hydrocele. From these facts the following deductions were made. The injected solution had been placed in the cord close to or into the hernial sac. This resulted in a chemical inflammation of the sac, edema of the surrounding tissues, closing off of the sac at the internal ring, and injury to the epithelial lining of the sac with consequent production of an exudate into the sac. After the absorption of this exudate or removal by aspiration, complete fibrinous obliteration of the sac occurred.

This contention was definitely proven by examining the specimen from one patient who, in all probability, could have been cured by the injection method if he had allowed us to continue the treatments.

In using the Phenol, Alcohol and Thuja mixture it has been demonstrated that the dose should not exceed 6 minims. In several instances 8 minims has produced a small area of necrosis in the tissue. This necrotic area did not produce trouble and in all probability would have resulted in resolution and replacement by fibrous tissue but it seems undesirable to obtain that much reaction. It is possible that the occasional systemic reaction with nausea and a feeling of lassitude on the second or third day after injection has been the result of necrosis. Since we have been using smaller doses at each injection we have observed fewer of these systemic reactions and also fewer indurations of the cord.

The end-result from this method of treatment cannot accurately be adjudged at this time because our results do not extend over a period of more than two years. From evidence at hand, however, I believe that we are justified in proclaiming this method of treating hernia as one which will not completely replace the surgical method but supplant it in those individuals who prefer not to have an operation and in those cases where surgery is contraindicated.

Dr. G. A. Earl, Saint Paul, Minn.: The first time I became interested in this work was because of a patient who had been operated twice with recurrences, the first time by someone else, and the second time by myself. Dr. Bratrud, with truss and injections, has produced a satisfactory result.

It may be that with the use of fascial tissue and more careful surgical work, there might not have been a recurrence from the surgical treatment. The operations had been done years previous.

Nevertheless, it was so interesting that I began the work one year ago. The more I see of the treatment, the more I become convinced that the method is here to stay along with surgery in the treatment of hernia.

We must first carefully diagnose the type of hernia. The speakers have pointed out the contra-indications. We have to take into consideration the age of our patients. If I have a youngster coming in with a beginning indirect inguinal hernia, I can assure him that it probably is going to take relatively few injections. If I have an aged man, in whom the tissues are weak and attenuated, and in whom there is a large hernia, I warn him that he will have to be more patient and that it may take many injections.

I have listened today with great interest to Dr. Bratrud and Dr. Rice. I feel that Dr. Bratrud has been a pioneer in this part of the country in taking this matter out of the realm of questionable practice and placing it where it belongs, in the hands of those who are more experienced in all the problems involved.

Dr. A. F. Bratrud (closing): I wish to thank Drs. Rice, Earl and Masson for discussing this paper and for the very frank and liberal discussion of same.

As far as replacing the surgical treatment of hernia by this method, I do not wish to convey the impression that it will. I am operating upon more hernias today than I ever have, but this is probably because of the volume that I see. Where large hernias cannot be properly reduced and held in place by a truss, plastic repair should be performed. Plastic repair of a hernia is not difficult. Without plastic repair there is going to be a very high percentage of recurrences.

I was particularly impressed with what Dr. Rice said in regard to early proliferation of tissues. Travis and Hall of New York University, in 1929, did some work with different solutions, and stated that proliferation began about the ninth to the twelfth day. Some of our sections show exactly what Dr. Rice has stated. There is edema of the tissues within twenty-four hours, and proliferation begins between the third and fourth days. We did not believe it was possible to obtain proliferation of fibroblastic tissues as early as this.

Only one injected case has to our knowledge come to autopsy. This was performed by the pathologist at the Midway Hospital in St. Paul. Careful dissection was made of the inguinal region, and he stated that there was such a perfect closure that he was unable to shove his thumb through the inguinal ring.

I feel that we can go on record and state that by using the combined method of treatment, that is, surgery with injections, we can reduce recurrences of hernia following operation to almost nothing.

These patients should be fitted with a truss after operation so as to give them additional support until there is perfect union. If there is any question of beginning recurrence or weakness, the case should be supplemented by injection to avoid recurrence following operation. As far as I know, I do not believe that there has been a single recurrence at the University of Minnesota following operation, since this treatment was started, although we have had three or four cases that have been supplemented by the injection treatment before recurrence was present.

It is surprising to me how many hernia patients show atrophy of one or both testicles upon the first examination. All patients should be examined for this.

Patients are advised to take proper care of their bowels after operation. They are also informed that they have a weakness which has been present since birth, and should they develop a cough, they should replace their trusses and wear them during that time. They are also advised to wear a truss during any period of heavy lifting or severe exertion.

Dr. Masson made a statement in regard to fat pads in umbilical, femoral or epigastric hernias. I have seen tremendously large sacs with a small neck in epigastric hernias. Where there is a fat pad present in the sac, the cases are not injected. This is a specific contraindication to this form of treatment. As a rule, pain in these cases is aggravated by the application of a truss, and unless pain and all symptoms can be completely relieved, the case is surgical.

As far as failure is concerned, we know of at least three failures to date. All of these are in cases which should have been surgical and they were so advised at the beginning of treatment, but insisted upon having the ambulant form of treatment.

Recurrences at the present time are low, but with the type of patient and type of hernias which we are treating, I shall be very well pleased if we can keep our recurrences below 10 per cent.

CLINICAL TUBERCULOSIS AMONG EMPLOYES OF LOCAL INSTITUTIONS CARING FOR TUBERCULOSIS PATIENTS†

A. T. LAIRD, M.D.

Nopeming, Minnesota

> "There is a good deal about Dr. David A. Stewart of Manitoba which is reminiscent of his fellow countryman the late Sir William Osler. Stewart, like Osler, has a choice collection of English words and classical quotations which he uses with intelligent and charming skillfulness. But more important in fixing his place in literature is the fact that David Stewart is a great physician who knows the people who have tuberculosis as he knows the tuberculosis his patients have."

THIS tribute to Dr. Stewart was penned I suspect by Dr. Hoyt E. Dearholt, the editor of the Wisconsin *Crusader.* In the June 1934 issue, "Some Postulates" by Dr. Stewart are briefly given, which have a direct bearing on our subject; one of them is the following:

> "The outstanding fact about tuberculosis is that it is an infectious disease. If there is even slight occasional contact, infection is likely; if contact is close infection is inevitable; if prolonged, disease will likely follow infection sooner or later; and when disease is once established, then disability, crippling, scattering of infection and death are all in the offing."

Heimbeck,[3] Geer,[1] Myers[5] and others have shown that nurses and medical students beginning their training often do not react to tuberculin; their studies and bedside work bring them in contact with open cases of tuberculosis and in the upper classes of the schools they attend, a much larger proportion give positive reactions to tuberculin.

In such schools Rigler[6] and others have been able to follow, in certain cases, the development of pulmonary tuberculosis from its inception, through various stages, to complete resolution or to the development of clinical disease.

Local Experiences*

NOPEMING SANATORIUM

In the twenty-three years that have passed since the opening of Nopeming Sanatorium there have been nearly 2,000 (1,987) employes. Included among them there have been fifty-seven physicians, 589 nurses, twenty-two nurses helpers, ten dietitians, 107 orderlies, 170 serving kitchen helpers, all brought in rather close contact with tuberculous patients. Besides them, there have been 197 maids, fifty-one laundry workers, 279 janitors, porters, choremen, etc., not to mention other persons variously employed.

Pupil Nurses.—Of the 589 nurses at least thirty-six had shown evidence of clinical tuberculosis at some time previous to their employment. Of the remaining 554 nearly a third were pupil nurses and about two-thirds graduate or practical nurses. For sixteen years, from 1915 to 1931, inclusive, the Sanatorium conducted a training school for nurses. The course given was one year in length. The school was accredited by the State Board of Nursing Examiners. Some of the girls after completing the course continued their studies in general hospitals and became graduate nurses. Most of the pupil nurses were between seventeen and twenty-two years of age.

Of the total enrolment in the school, amounting to 193, there were five who remained less than a week. Of the 188 who stayed longer, 113 remained the full year and completed the course. Of the entire 188, there were eighteen who were known to have had clinical tuberculosis before enrolment. Of the 170 remaining six have died of tuberculosis. Four of these six gave a family history of tuberculosis. All six worked in other tuberculosis institutions before or after their year of training at Nopeming.

Beside these six, at least eleven others have developed somewhat definite clinical tuberculosis. Five of these had close relatives who were tuberculous. The others worked for considerable periods either before or after their course of study at Nopeming in other institutions where tuberculous patients were cared for.

Altogether there have been seventeen known cases of more or less definite clinical tuberculosis in this group of young pupil nurses, mostly under twenty years of age.

---

†Read before the Trudeau Society at the Annual Meeting of the Minnesota State Medical Association, Duluth, July 16, 1934.

*These summaries have been corrected to May 1, 1935.

There may have been others as it has been impossible to secure reliable data regarding all former pupils. Bad news, however, travels fast and it is probable we would have heard of cases of serious illness through correspondence between classmates or otherwise.

The school was discontinued in 1931. The last class numbered twelve pupils. All were given Mantoux tuberculin tests (0.1 milligram old tuberculin) on September 30, 1930. All but two showed negative reactions. On October 3, 1930, the ten showing negative reactions still did not react to injections of a full milligram of old tuberculin intracutaneously but on February 6, 1931, every member of the class reacted positively even to one tenth milligram.

Two members of this class have shown evidences of clinical tuberculosis, one of them developing parenchymal lesions in the lung and some suspicious symptoms which have since disappeared. She was given strict rest treatment and is now in apparently good health. The other one developed an adenitis in the left axilla. A biopsy of this gland has shown the presence of tubercle bacilli.

Graduate and Practical Nurses.—The 359 graduate and practical nurses who have been employed at Nopeming were as a rule older than the pupil nurses just considered. Most of them were between twenty-five and forty years of age. Eighteen had been tuberculosis patients. Of the 341 remaining, five are known to have developed some evidence of clinical tuberculosis. One, a graduate nurse has died. Her death occurred some years subsequent to her residence at Nopeming, after her marriage to a patient who died from the disease.

Women Employees.—Beside the 58 nurses 643 other women have been employed at Nopeming. Five of them developed clinical tuberculosis. One of them died. She was a sister of a patient who had both pulmonary and glandular tuberculosis. Another woman employee had positive sputum; she was given sanatorium treatment. Two who had parenchymal x-ray lesions with symptoms but not positive sputum were put to bed. The fifth one had a parenchymal lesion and a few symptoms. She was simply kept under close observation.

To us it seems quite evident that among women who are sanatorium employes we are likely to find more cases of clinical tuberculosis in the nursing group than in the groups not brought in such close contact with patients. Among the nurses there are likely to be more cases in the age group under twenty-five than between that age and forty.

Physicians.—Of fifty-seven physicians who have been employed at Nopeming, six were tuberculous patients before entering service. Three who came with negative Mantoux reactions later gave positive reactions. One physician since leaving Nopeming has had hemoptysis but is now in good health.

Male Employes.—Of 700 male employes, not physicians, about 150 were ex-patients. Of the 550 others, three have died of tuberculosis. One was a man seventy-one years of age who had been a night watchman and janitor at Nopeming for fourteen years before becoming ill. Previously he had been a farmer, coachman and a worker in a factory where pipe and boiler covering was made. X-rays had shown some evidence of old presumably healed tuberculosis. Another man died at Nopeming of tuberculosis after four years of service as porter and janitor. He was forty-seven years of age. The third patient was twenty-four years of age. There was no family history of tuberculosis. He had worked at Nopeming five years as a fireman and had very little contact with patients.

One other case of well advanced clinical tuberculosis is known to have developed among male employes who were not ex-patients.

Duluth Hospitals

Since 1931 in the two larger Duluth Hospitals, of 331 pupil nurses given Mantoux tests (0.1 milligram old tuberculin) at a date near the beginning of their training, 112 (50 per cent) gave negative reactions. Both hospitals have had tuberculosis divisions for ten years. It has not been possible to arrange for tests at the close of training but second tuberculin tests have been given to a number of those showing negative reactions at the first test. Thirty-one girls having negative tuberculin reactions on admission are known to have shown positive reactions seven months to two years later. It is probable that the entire group would have shown positive reactions at the close of training as this is the usual experience in other hospitals where tuberculosis patients are treated.

Since 1931 x-rays have been taken of all of the pupil nurses in both hospitals upon admission to training. In at least twelve cases some evidence of tuberculosis was found on the first x-ray examination. Subsequent x-rays have not been taken except in certain suspicious cases or in some instances after a negative Mantoux reaction was replaced by a positive one. The rule followed in certain hospitals of taking x-rays of the nurses every six months or even every three months seems to me to afford more protection.

In one of the hospitals there were 585 pupil nurses in training during the ten year period from January 1, 1925, to January 1, 1935. Among them, twenty (about 3.4 per cent) showed some evidence of clinical tuberculosis; ten (1.6 per cent) showed definite pulmonary lesions with symptoms and received treatment; one of these died; of three we have no report as to present health; four returned to work and have kept well; one never worked in the tuberculosis division. In addition to these ten, five of the other girls had pleuritis and five were classed as suspects.

In this same hospital, fifty-eight employes not nurses have been examined. This group included men and women of various ages. Thirty-two (55 per cent) of these adults gave negative reactions to the Mantoux test. These tests have been repeated in a few cases, but in not enough to warrant definite conclusions. In a number of cases where there is no close contact with tuberculosis the reactions have remained negative. X-rays were also taken of all the members of this group. In only five was there any evidence of parenchymal pulmonary lesions. One employee was found to have active pulmonary tuberculosis and subsequently died.

It seems to me it must be evident that in hospitals and sanatoriums so far as nurses are concerned, contact is clear and infection is inevitable. Disease will likely follow if the contact is prolonged, unless special precautions are taken to limit the amount of infection and prevent undue operation of predisposing causes.

Although a slight amount of infection may be of advantage to the individual who has acquired it, under present conditions the amount of infection to which employes are exposed in hospitals is so difficult to control that it should be reduced to a minimum.

At the present time there is probably less exposure than there has ever been and it has not been shown that there is any increase in the number of clinical cases developing over what has actually occurred in previous years.

Nurses and medical students can not expect that all risks connected with their studies be removed but they can ask that unnecessary exposure to infectious disease be eliminated.

Geer[1] has demonstrated that at least the incidence of actual illness can be reduced. The amount of clinical tuberculosis among pupil nurses in the Ancker Hospital in Saint Paul, following the introduction of a strict aseptic technic, has been reduced from 5.5 per cent among 112 pupil nurses, from 1928 to 1930, to 1.6 per cent among 181, from 1930 to 1932. Yet even with this technic practically all the nurses still leave their training with positive tuberculin reactions. Geer's recommendation that every patient admitted to a general hospital should be studied thoroughly, preferably by x-ray to exclude unsuspected sources of infection deserves careful consideration. At Glen Lake Sanatorium,[2] Oak Terrace, Minn., all nurses have x-rays taken of their chest every three months.

The technic Geer describes is especially applicable to bed patients and practicable methods for protecting contacts more thoroughly from infection by ambulant positive sputum cases are still to be devised. Dr. Jennings[4] of Glen Lake has been studying the problem.

In spite of our best efforts it is probably impossible to prevent entirely the infection of contacts of positive sputum cases whether in the hospital or in the home. The infectious patients, however, can be isolated from their families in hospitals, and there the amount of infection to which nurses are exposed can be reduced so that it need not be massive or prolonged. To prevent clinical disease we must also limit the operation of predisposing causes. That they are still an important factor in the production of illness is shown dramatically by Whitney.[8] According to her tables, medical students and physicians may often acquire infection, but their mortality from tuberculosis is less than that of men in various other occupations. In 1930, among gainfully employed males, the death rate per 100,000 in the United States for physicians was 27; agricultural workers, 45; clerks, 68; skilled workers, 69; unskilled laborers, 194; and for factory and building construction laborers, 239, nearly ten times the physicians' rate.

We have no similar figures for nurses. Their mortality from the disease is doubtless somewhat higher than in other occupations. At least we know that their morbidity from the disease in hospital service can be reduced.

Let me close with another of Dr. Stewart's[7] postulates:

> "One prime essential is to cover the field, to follow up every clue with examinations and re-examinations, to bookkeep carefully year by year records of all known sources of infection and all people possibly infected. To find tuberculosis early there is one way only, and that is to hunt for it among people who are not yet ill but who have been in contact with open disease."

References

1. Geer, Everett K.: Tuberculosis among nurses. Arch. Int. Med., 49:77, 1932.
   Idem: Primary tuberculosis among nurses. Amer. Rev. Tubercu., 29:88, 1934.
2. Glen Lake Sanatorium (Oak Terrace, Minn.): Report for 1932-33.
3. Heimbeck, Johannes: Immunity to tuberculosis. Arch. Int. Med., 40:336, 1928.
4. Jennings, Frank L.: Factors contributing to the further reduction of tuberculous infection. Minn. Med., 18:280, 1925.
5. Myers, J. A., Diehl, H. S., and Lees, M.D.: The student nurse and tuberculosis. Jour. Am. Med. Assn., 102:2086, 1934.
6. Rigler, Leo, G. and Exner, Frederick, B.: The latent period in the roentgen diagnosis of pulmonary tuberculosis. Jour. Am. Med. Assn., 102: 1250, 1934.
7. Stewart, David A.: Some postulates. The Crusader (Wisconsin Anti-Tuberculosis Association, Milwaukee), 26:1,1934.
8. Whitney, Jessamine S.: Facts and figures about tuberculosis, New York Natl. Tuberc. Assn., p. 6, 1931.
   Idem: Death rates by occupation. New York: Nat. Tub. Assn., p. 30, 1934.

TREATMENT OF CARDIAC EMERGENCIES*

M. H. NATHANSON, M.D.

Minneapolis

THE history of heart disease is usually that of slow, gradual progress, but at times the course is interrupted by acute crises, the proper treatment of which may be life-saving. The present report consists of a discussion of the mechanisms underlying the most important cardiac emergencies and the therapy. Mention will also be made of treatment which may be directed at the prevention of these critical states.

Pericardial Effusion

There is no doubt that patients are occasionally permitted to die because of failure to aspirate an effusion in the pericardial sac. A study of hospital records by Williamson and Ets[8] of Chicago disclosed the following: Of fifty-four cases of pericardial effusion which came to autopsy there were nine in which no puncture was done and in which it seemed reasonable that this procedure might have been life-saving. In four other cases pericardial puncture would have been of great benefit, if not life-saving. The physiological changes brought about by a pericardial effusion are demonstrated best by experiments in animals. If fluid is injected into the pericardial cavity of a dog and the intrapericardial, venous and arterial pressures are measured, it will be found that as the intrapericardial pressure rises, the venous pressure goes up and the arterial pressure and cardiac output are reduced correspondingly. For a given increment in pericardial pressure these changes are more pronounced at higher pressure levels. The circulation comes to an end when the intrapericardial pressure equals that in the venæ cavæ so that the great veins are completely collapsed. It is, therefore, characteristic in acute pericardial effusion for death to be sudden in patients supposedly in good condition. This may be explained by the sudden increase of intrapericardial pressure to the critical level at which the venæ cavæ collapse. There is no method by which the changes in the intrapericardial pressure or pressure in the vena cava may be measured. However, some information as to progress may be obtained by careful and repeated observation of the arterial pressure. A steady fall of the blood pressure and especially a sudden increase in the rate of the fall is a danger signal. If this is associated with increased respiratory distress, cyanosis and distension of the jugular veins, aspiration should be performed at once. The fluid first accumulates about the apex of the heart and then gravitates toward both pleural cavities with the largest volume along the left border and posterior to the heart. The best site for aspiration is in the fifth interspace just within the left border of the cardiac dullness. Here the distended sac is in close contact with the chest wall and the pleura is pushed aside. A long needle of about one millimeter calibre attached to a fifty or 100 c.c. syringe should be used. The syringe can be removed and emptied and then connected again until the proper amount has been removed. It is advisable to anesthetize the skin and subcutaneous tissue. The needle is inserted in the interspace and slowly directed upward, backward and medially toward the hilus of the left lung. After forcing the needle in this direction a variable distance, usually about 4 cm., it is possible in most cases to feel the penetration of the firm pericardial membrane. If fluid is not obtained the needle should be inserted more deeply and the direction changed. There is very little danger in exploring in an attempt to localize fluid. The cardiac pulsation is usually felt against the needle when the heart is reached. If fluid is not obtained at this site, aspiration should be attempted posteriorly below the angle of the left scapula, especially if there are signs of compression of the left lung posteriorly. The left arm is raised so that the scapula is rotated upward and the needle is inserted in the eighth or ninth interspace for a distance of about seven or eight centimeters. In some cases, especially with tuberculous effusions, there is a tendency for the fluid to reaccumulate rather rapidly. This may be prevented in a measure by injecting air following the removal of fluid. A volume of air equal to about one-half the amount of fluid removed should be injected. This has been carried out by the writer in two cases with satisfactory results.

---

*Read before the Northern Minnesota Medical Association, Brainerd, Minnesota, September 10, 1934.

Embolic Manifestations

Mural thrombi frequently form in the auricles in rheumatic heart disease and in the ventricles in coronary disease. Occasionally portions of a thrombus dislodge and pass into the circulation. The manifestations depend upon the site at which the embolus lodges and the size of the embolus. Two points may be emphasized: first, the frequency of this accident, and second, the stage in cardiac disease at which embolic phenomena appear. There is a general impression that embolic accidents are characteristic of acute inflammation of the heart valves, subacute bacterial endocarditis, but are rare occurrences in chronic heart disease. Laws and Levine,[1] however, found that in seventeen of 148 cases (11.5 per cent) of chronic rheumatic heart disease, death was embolic in origin. A wrong impression also is that embolic phenomena occur in the late stages of heart disease, leaving little to be gained by treatment because of the serious nature of the underlying cardiac condition. This is decidedly an erroneous conception. Emboli particularly in rheumatic heart disease may interrupt the course of the disease at a very favorably period. In practically all cases reported by Laws and Levine cardiac compensation was practically normal at the time this circulatory accident occurred. One gains the impression that had not the embolus occurred, the patient would have lived for a considerable length of time. I have observed emboli in a patient with chronic valvular disease ten years before the patient died of congestive heart failure.

As to recognition, there are several points which may be helpful. First, emboli in chronic heart disease occur almost uniformly with auricular fibrillation. In the seventeen cases of embolism reported by Laws and Levine, fibrillation was present in sixteen. Therefore, in chronic auricular fibrillation, if there is a sudden onset of manifestations which may be attributed to ischemia of an organ, the most probable explanation is an embolus from an intracardiac thrombus. Occlusion of a large pulmonary branch may lead to sudden death. Manifestations of blockage of a smaller branch are sudden pain in the chest, cough and dyspnea. Hemoptysis may occur but is not an essential feature. Morphine is indicated and oxygen, if pulmonary congestion and cyanosis are present. Occlusion of mesenteric branch in its typical form manifests itself in a sudden attack of colicky abdominal pain, later followed by bloody stools and by symptoms of intestinal obstruction. The immediate treatment is the relief of the pain by morphine and the treatment of shock if it is present. Although the prognosis is very gloomy, recovery may follow surgical intervention and occasionally recovery is spontaneous. Recently Sargent[7] reported a case of mesenteric thrombosis which was explored, but resection was not done because of the age of the patient and the amount of tissue involved. The patient after a stormy period made a complete recovery. Meyer[2] reviewed ninety-two proved cases of mesenteric thrombosis which have been reported in the past ten years. There were thirty-nine recoveries and fifty-three deaths, or a gross mortality of 57.6 per cent. There were forty-three cases in which resection of the affected bowel were done with a mortality of 32.6 per cent. Recoveries included three cases of practically complete removal of the small intestine. It is therefore evident that resection of the involved bowel offers the best hope for recovery and should be done without delay.

Peripheral Emboli

Occlusion of a vessel of an extremity is usually evidenced by pain, pallor and reduced temperature in the involved limb with absence of arterial pulsation. The pain is usually referred to a point distal to the site of the obstruction and, therefore, is of no aid in localization. In Zierold's[9] series of twenty cases the lower extremities were involved in eighteen and the upper in two. He found that the point of most frequent occlusion was in the lower portion of the femoral artery above the popliteal space. The next most frequent site was at the branching of the profunda femora. Embolectomy should be performed as soon as the diagnosis is made and the site of the occlusion localized. Operation, however, is not entirely hopeless even after a considerable period has elapsed. In two patients of Zierold's series circulation was restored by embolectomy after a period of thirty-six hours in one instance, and seventy-two hours in another. Surgery is not indicated in all cases. In the upper extremity the collateral circulation is such that emboli in the brachial or axillary arteries have more than an even chance of being followed by recovery. Also emboli lodging at the bifurcation of the popliteal artery do not require surgery.

In a large measure the embolic accidents of chronic heart disease are preventable. Since emboli are rare when the heart is beating regularly, the preventive treatment consists in an attempt to restore normal rhythm in auricular fibrillation. This may be accomplished in at least 50 per cent of the cases by the proper administration of quinidine.

Abnormal Cardiac Rhythms

The sudden onset of a very rapid heart rate may give rise to acute symptoms, either pain, dizziness or respiratory distress. The mechanism is usually the development of an abnormal rhythmic focus in the myocardium, in the auricles, junctional tissues or ventricles, but may be a paroxysm of auricular flutter or fibrillation. The cardiac efficiency becomes markedly reduced, the minute volume being reduced to approximately 40 per cent of the normal. Although attacks do not usually endanger life, they cause considerable distress and anxiety. Occasionally prolonged attacks may exhaust the heart muscle and lead to fatal heart failure. The methods for terminating the attack consist of stimulation of the vagus nerve by various means, and of administering drugs which act on the myocardium. Reflex stimulation of the vagus nerve is obtained by pressure over the carotid artery, by ocular compression, by deep breathing or holding the breath and by inducing gagging or vomiting. The most effective method of vagus stimulation is by pressure over the carotid sinus, a localized portion of the internal carotid artery. Pressure is made on the carotid pulsation at the level of the thyroid cartilage and is continued for from fifteen to thirty seconds. The right carotid artery should be compressed first and if there is no effect, pressure should be applied on both sides. The results may be very dramatic, as the paroxysm may cease instantly. The vagus may also be stimulated chemically by the use of a cholin derivative, acetyl beta methylcholine.† A dose of twenty to thirty millegrams subcutaneously will often terminate an attack. In studies which are in progress[3] it has been demonstrated that acetyl beta methylcholine exerts its maximum effect on the heart about five minutes after a subcutaneous injection. If there is no effect within five minutes, carotid pressure should then be carried out and this additional procedure is almost uniformly followed by termination of the paroxysm. The other effective measure is the administration of drugs which depress the excitability of the myocardium. The most effective compound is quinidine. During the attack quinidine sulphate may be given in doses of five grains every hour for five or six doses. This is particularly effective in tachycardias of ventricular origin. This drug is also valuable as a prophylactic measure in cases in which the attacks are frequent. The dose should be from ten to twenty grains a day. It is also important to eliminate all possible exciting factors such as tobacco, coffee, constipation, fatigue and physical and mental strain.

---

†Acetyl beta methylcholine chloride is marketed under the trade name of mecholin in sealed ampoules. A convenient method is to dissolve the contents of a 0.1 gm. ampoule in 5 c.c. of distilled water. The substance is freely soluble in water, and the solution does not deteriorate on standing. The material is then ready to be injected in from 1 c.c. to 1.5 c.c. doses.

Cardiac Syncope and Sudden Death

Cardiac syncope is a sudden and temporary loss of consciousness due to a cerebral anemia of cardiac origin. Sudden cardiac death may be considered as a fatal cardiac syncope. These conditions may be discussed under abnormal rhythms since they are usually due to a disturbance in the rhythmic contraction of the heart. The treatment must be largely preventive in nature, since the onset is so sudden and recovery or death occurs so promptly that it is usually impossible to treat the attack.

Temporary loss of consciousness in heart disease is usually associated with complete heart block, the Adams-Stokes syndrome. The syncope is due to a ventricular standstill in most cases. In studies already reported,[4] it was demonstrated that cardiac standstill may be induced in many human subjects by pressure over the right carotid artery. This affords an accurate method for evaluating the effectiveness of drugs in cardiac standstill. From results of an extensive study on a number of drugs it was found that the only effective substances were adrenalin and chemically related compounds. Adrenalin is the most active and should be used in doses of 1 c.c., 1-1000 solution, subcutaneously every three hours when syncopal attacks are frequent. Proper administration of adrenalin is by far the most effective means of preventing syncopal attacks due to cardiac standstill. In cases in which oral administration is desirable, ephedrine sulphate may prevent attacks but large doses are usually necessary. It is useless to employ less than 50 milligrams three or four times a day. If this is ineffective, the dose should be increased to 100 milligrams. If the attacks still continue, it will be necessary to resort to hypodermic medication with adrenalin. Occasionally standstill is observed on the operating table, following certain poisonings and associated with asphyxia of the newborn. In these cases it is necessary to administer adrenalin by intracardiac injection. This often produces miraculous results. The dose should be 1 to 2 c.c. and should be injected with a long needle penetrating the chest in the fourth or fifth interspace over the heart. Blood should first be aspirated to prove the entrance of the needle into the cardiac cavity. A part of the solution is then injected and the injection continued as the needle is withdrawn in order to make certain that some of the adrenalin is deposited within the heart muscle.

Some recent studies[5] which are still in progress indicate that there are possibilities in the prevention of the fatal cardiac syncope which is the characteristic termination of the anginal type of coronary disease. An analysis of 142 autopsies of sudden death associated with coronary disease showed that myocardial damage sufficient to explain the death was present in only 7 per cent of the cases. Sudden cardiac death therefore is usually the result of the onset of a physiological mechanism in the heart which is incompatible with life. It is practically conclusive that this mechanism is ventricular fibrillation, a condition in which the normal contraction of the ventricular myocardium is replaced by rapid irregular movements of a minute amplitude. The muscle goes into a state of fine quivering and twitching resulting in a completely ineffective contraction. In the development of experimental and clinical ventricular fibrillation the heart passes through a pre-fibrillation state in which premature beats develop at a rapid rate from multiple foci in the ventricles. These prefibrillation rhythms can be induced in man by the intravenous injection of adrenalin. It was found they can be uniformly prevented by the administration of quinidine. It is therefore recommended that quinidine sulphate be used as a prophylactic measure in coronary disease in the following situations: first, during a period of two or three weeks following coronary thrombosis, and second, in cases of angina pectoris in which ventricular extrasystoles develop. The doses should be five grains three or four times a day.

Cardiac Asthma

Cardiac asthma or paroxysmal cardiac dyspnea occurs usually in heart disease which affects primarily the left ventricle. It is therefore associated with hypertension heart, sclerosis of the left coronary artery, aortic valvular disease and narrowing of the orifice of the left coronary artery due to luetic aortitis. The attacks consist of paroxysms of acute orthopnea lasting from a few minutes to several hours, coming on usually during sleep but sometimes after exertion or over-eating. They vary in degree from mild and short attacks to intense agonizing seizures which may terminate in death. There are several different types of cardiac asthma.[6] The therapy depends largely on the underlying mechanism, which may be determined by examination of the lungs. If the lungs are clear the mechanism is a disturbance in the respiratory center causing cyclic breathing with the patient awakening in periods of hyperpnea. This may be effectively prevented by the intravenous injection at bedtime of 0.24 gm. of aminophyllin. If examination of the lungs reveals bronchial spasm or edema of the lungs, relief may occasionally be obtained by a tablet of nitroglycerine under the tongue. The results, however, are much less striking than in the case of cardiac pain. The most reliable and usually the only therapy required is morphine, which should be used in doses of one-fourth to one-half grain subcutaneously. The larger dose is frequently necessary. In cases showing edema of the lungs removal of 500 c.c. of blood from the veins through a large needle may be helpful. This is indicated only when there is peripheral venous engorgement as evidenced by distension of the jugular veins. However, I have been impressed with the frequency of a shock-like condition associated with pulmonary edema in which the peripheral venous pressure is low and the jugular veins collapsed due to a peripheral circulatory failure. In these cases withdrawal of blood is contraindicated; in fact, it is often impossible to obtain blood by a venipuncture. Another measure which may bring rapid improvement in pulmonary edema is peripheral venous stasis procured by the application of four tourniquets over the extremities. This is carried out most conveniently by the application of four blood pressure cuffs connected in a series to a sphygmomanometer. The pressure should be just above the level of the diastolic pressure. If this apparatus is not at hand, rubber tubing may be substituted. Pressure is continued for about ten minutes, released for a minute, and then repeated. The beneficial effects are due to a shunting of the blood from the congested lungs to the extremities. In edema of the lungs showing definite cyanosis, the administration of oxygen is indicated.

To a degree, attacks of cardiac asthma may be prevented by the use of coronary dilating drugs and the administration of sedatives at night. The evening meal should be the smallest of the day. The patient should go to sleep well propped up in bed with some way to prevent sliding down.

Cardiac Pain

Cardiac pain may be divided into two main types: (1) attacks of short duration, the anginal attack, which is due to a myocardial ischemia of coronary vasospastic origin; and (2) the prolonged attack of pain in which the myocardial ischemia is due to thrombosis of a coronary branch. Because of the short duration of the anginal attack, the physician is seldom called upon to administer treatment. The patient is instructed to carry hypodermic tablets of nitroglycerine, gr. 1/150, at all times and to place a tablet under the tongue at the onset of the attack. If the attack is not relieved within fifteen minutes after a maximum of three tablets, the pain is most probably caused by a coronary thrombosis and further administration of nitroglycerine might be definitely harmful, as the shock which accompanies the vascular occlusion may be intensified. Most attacks of coronary thrombosis begin while the patient is at rest. The pain is usually referred to the sternum or epigastrium. As to treatment, the pain can only be relieved by morphine and it is useless to start with less than one-half grain subcutaneously. This should be repeated if necessary. If circulatory collapse is present as shown by faint heart sounds, small rapid pulse and low blood pressure, stimulation with caffein, sodium benzoate, coramine or metrazol intravenously is indicated. If frequent extrasystoles or paroxysmal tachycardias develop, quinidine should be administered. Oxygen is indicated when pulmonary congestion and cyanosis are present. As already mentioned, if the patient survives an acute attack, quinidine should be administered for several weeks in order to lessen the possibility of sudden death.

Bibliography

1. Laws, C. L., and Levine, S. A.: Clinical notes on rheumatic heart disease with special reference to the cause of death. Am. Jour. Med. Sci., 186:833, 1933.
2. Meyer, J. L.: Mesenteric vascular occlusion. Ann. Surg., 94:88, 1931.
3. Nathanson, M. H.: The effect of Acetyl-B-Methylcholin on ventricular rhythms. (To be published soon.)
4. Nathanson, M. H.: Effect of drugs on cardiac standstill induced by pressure on carotid sinus. Arch. Int. Med., 51:387, 1933; Further studies on the effect of drugs on induced cardiac standstill, Arch. Int. Med., 54:111, 1934.
5. Nathanson, M. H.: Observations on the pathology and pharmacology of syncope and sudden death in coronary disease. Trans. Am. Heart Ass'n, Am. Heart Jour., 10:393, 1935.
6. Nathanson, M. H.: Diagnosis and management of coronary arterial disease, Minn. Med., 15:150, 1932.
7. Sargent, R. M.: Spontaneous recovery in superior mesenteric thrombosis. Brit. Med. Jour., 2:64, 1934.
8. Williamson, C. S., and Ets, H. N.: The rationale of therapeutic puncture in pericardial effusion. Arch. Int. Med. 38:206, 1926.
9. Zierold, A. A.: The surgical treatment of arterial embolism. Jour. Am. Med. Assn., 101:7, 1933.

CASE REPORTS

PAPILLARY COLLOID ADENOCARINOMA OF THE EXTRAHEPATIC BILE DUCTS*

WALTMAN WALTERS, M.D.
and
PAUL F. OLSON, M.D.
Rochester, Minnesota

The extrahepatic bile ducts are seldom the site of malignancy, and a papillary colloid adenocarcinoma situated in these ducts is distinctly rare. Such a case was recently encountered by one of us (Walters) and led to a review of the surgical records in such cases at The Mayo Clinic.

Tumors of the bile ducts observed at the clinic have been previously reported by Renshaw and by Marshall. More recently, Judd and Gray have reviewed all cases of carcinoma of the bile ducts from 1907 through 1931. Including cases subsequent to their report, fifty carcinomas of the extrahepatic bile ducts have been observed at operation and the diagnosis has been confirmed by microscopic examination of removed tissue. This figure is exclusive of malignancies of the ampulla of Vater, as we agree with Ewing that "except in very early cases it is difficult to determine the exact origin of these tumors. Some arise at the termination of the common duct, others in the mucosa of the pancreatic duct, still others in the ampulla proper or at the papilla."

These fifty tumors were situated as follows: in the common duct, thirty-three; in the hepatic ducts, ten, and in the cystic duct, seven.

Pathologically, carcinomas of the extrahepatic bile ducts are classified by Ewing into: (1) villous growths, and (2) nodular masses. He also pointed out that "more diffuse growths may extend along the duct." Of the fifty carcinomas observed at the clinic, only five, including those we are reporting, were of the villous or papillary type, three being situated in the common duct and two in the hepatic ducts.

Report of a Case of Papillary Colloid Adenocarcinoma

A man, sixty-seven years of age, complained on admission of epigastric pain and jaundice. The first attacks of pain had occurred two years previously. They had been associated with nausea and at times with vomiting, and had been sufficiently severe to require morphine for relief. Six months prior to admission, he had had another attack of epigastric pain, but this attack was less prolonged and did not require an opiate. Several times subsequently he had had slight distress in the abdomen. A week before he came to the clinic he had suffered from another attack of epigastric pain which had been more severe than any previous attack; this had been associated with vomiting and was followed by jaundice which had persisted. The patient had lost 30 pounds (13.6 kg) in the four months preceding admission.

Physical examination revealed some emaciation and moderate icterus; otherwise the results were negative. Laboratory investigations likewise revealed nothing unusual except elevation of the level of serum bilirubin to 8.8 mg. per 100 c.c., with a direct reaction. Preoperative readings of serum bilirubin in mg. per 100 c.c. were as follows: 8.8, 6.4, 7.1, 7.1, 7.1 and 7.0. At operation one of us (Walters) found the gallbladder to be of normal size. On opening it, however, a moderate amount of colorless fluid was drained out. The common duct was dilated and measured about 3 cm. in diameter. It was opened and found to be distended with masses of mucoid material, which were removed. Bits of villous carcinomatous tissue were obtained from the hepatic ducts in the region of their bifurcation (Fig. 1). The ducts were of sufficient size that they could be explored with the little finger, and at the bifurcation of the hepatic ducts a papillary lesion was found with a pedicle about 1.5 cm. in diameter. This

---

*From the Division of Surgery, The Mayo Clinic, Rochester, Minnesota.

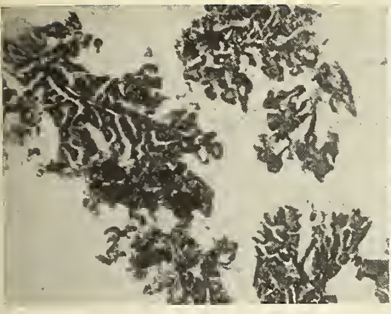


Fig. 1. Villous carcinomatous tissue obtained from hepatic ducts in the region of their bifurcation.

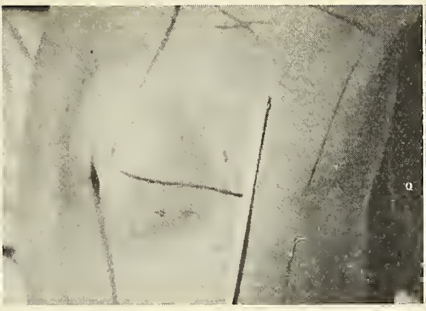


Fig. 2. Posterior tumor in lower thoracic region.

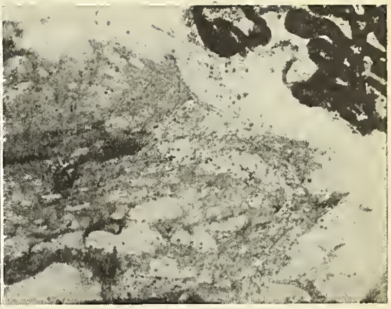


Fig. 3. Exudate from posterior tumor, showing mucus and bits of tissue having characteristics of mucoid and papillary adenocarcinoma.

tumor was quite soft and it was broken up, leaving only a small bit of the pedicle attached to the wall of the duct. This latter was inaccessible to direct attack, so two 5 mg. needles of radium were placed in the duct at this point and removed fourteen hours later. The common duct was closed over a T-tube.

The postoperative course was uneventful. The patient regained his strength slowly and the jaundice was considerably reduced two weeks after the operation, at which time the value for serum bilirubin was 3.7 mg. per 100 c.c. One month after the operation the patient was well enough to be dismissed from the clinic and to return home. Before he left, however, a tumor 5 by 7 cm. was observed posteriorly in the right lower thoracic region between the levels of the ninth, tenth and eleventh ribs. This tumor was definitely circumscribed and did not appear at that time to be related to the intra-abdominal lesion.

After the patient returned home, this tumor increased in size. It was incised by his home surgeon, three weeks later, and about "a pint of gelatinous material" was removed. Two and a half months after this operation, the patient returned to the clinic.

The mass had increased in size by this time to about 8 by 10 cm. (Fig. 2) and it was painful. It continued to discharge bloody mucoid material and pressure on the abdomen increased this discharge. A second nodule, 3 cm. in diameter, could be palpated in the abdominal wall to the left of the scar of the right rectus incision. Roentgenograms of the thorax did not reveal anything abnormal and the diaphragm was not fixed. The patient has remained free from jaundice. Microscopic examination of material exuding from this posterior tumor revealed mucus and bits of tissue having the characteristics of mucoid adenocarcinoma and papillary adenocarcinoma (Fig. 3).

Comment

Among carcinomas situated in the extrahepatic bile ducts the tumor here reported is unusual on three counts: (1) because of its villous or papillary type, (2) because of its mucoid characteristics, and (3) because of its situation in the common hepatic duct at the bifurcation of the right and left hepatic ducts.

Milles and Koucky reviewed the literature in 1932 and of carcinomas of the extrahepatic bile ducts found only thirty-seven, including one of their own, which were situated proximal to the junction of the cystic duct with the common bile duct. David added two cases in which the hepatic duct was the site of an adenocarcinoma. McLaughlin noted one carcinoma that was situated in the left hepatic duct and another that was situated in the common hepatic duct. Rolleston and McNee, in reviewing ninety-two cases of tumor of the extrahepatic biliary ducts, found that nineteen of the tumors were situated in the common hepatic duct and four in the right or the left hepatic ducts. As has been said of the fifty tumors of the extrahepatic biliary ducts encountered at the clinic, ten were situated in the hepatic ducts.

Papillary carcinomas may be of two types: papillary squamous cell carcinomas, such as are seen in the urinary bladder, and papillary adenocarcinomas, of which the case reported is an example. References to such tumors situated in the bile ducts are distinctly rare in the literature. Shapiro and Lifvendahl report one papillary adenocarcinoma among fifteen tumors of the extrahepatic bile ducts observed at the Cook County Hospital in Chicago. Rolleston and McNee, in their review of ninety-two tumors of the bile ducts, refer to only one similar to that we are reporting: "A papillomatous growth from the inside of the common duct was removed by Sir W. Bennett from a woman at St. George's Hospital. It was a branched papilloma, composed on a basis of fibrous tissue covered over by columnar epithelium. In places the columnar tissue had undergone mucoid degeneration. The after history of the patient, however, rather suggested malignant disease." Of forty-five tumors of the bile ducts examined microscopically by Rolleston and McNee, only one was found to be a mucoid or so-called "colloid" carcinoma.

The secondary tumor which appeared subsequently in the thoracolumbar region might have resulted either from metastasis or from direct extension of the primary growth. In favor of the latter theory is its presence on the right side, in a position not far from being directly posterior to the site of the original lesion. In addition, pressure on the abdomen increased the discharge from the posterior sinus. Against this theory of direct extension, however, is the observation that at operation the primary tumor was found to be apparently confined within the lumen of the bile ducts, and that when the posterior tumor first appeared it was discrete and was apparently unattached.

Bibliography

1. David, V. C.: Carcinoma of the hepatic duct. Ann. Surg., 96:381-384, (Sept.) 1932.
2. Ewing, James: Neoplastic diseases; a treatise on tumors. Ed. 3, Philadelphia, W. B. Saunders Co., 1928, pp. 741-744.
3. Judd, E. S., and Gray, H. K.: Carcinoma of the gall-bladder and bile ducts. Surg., Gynec. and Obst., 55:308-315, (Sept.) 1932.
4. Marshall, J. M.: Tumors of the bile ducts. Surg., Gynec. and Obst., 54:6-12, (Jan.) 1932.
5. McLaughlin, C. W., Jr.: Tumors of the extrahepatic bile ducts, exclusive of the ampulla of Vater. Can. Med. Assn. Jour., 28:255-265, (Mar.) 1933.
6. Milles, George, and Koucky, J. D.: Carcinoma of the hepatic duct. Ann. Surg., 95:468-470, (Mar.) 1932.
7. Renshaw, Kinsley: Malignant neoplasms of the extra-hepatic biliary ducts. Ann. Surg., 76:205-221, (Aug.) 1922.
8. Rolleston, Humphry, and McNee, J. W.: Diseases of the liver, gall-bladder and bile-ducts. Ed. 3, London, Macmillan and Co., 1929, pp. 741-758.
9. Shapiro, P. F., and Lifvendahl, R. A.: Tumors of the extrahepatic bile ducts. Ann. Surg., 94:61-79, (July) 1931.

INTRAMEDULLARY TUMOR OF THE SPINAL CORD*

ALBERT E. OLSON, M.D.

Duluth, Minnesota

Spinal cord tumors occur infrequently. They are of general interest because they are often confused with other diseases, especially surgical diseases of the abdomen, and because they are quite amenable to surgical correction if operated upon early enough. I shall not stress the neurological aspects except in so far as they have a practical bearing on surgical treatment.

This patient, K. D., a man thirty-eight years of age and a laborer, was first examined at our offices on March 29, 1933. He stated that until four months previous he had enjoyed good health. Then he noticed weakness of both legs and moderate aching in both knees. He stated that he did not feel secure in walking and that his condition had remained the same until four weeks before. At that time he complained of more marked weakness in both legs, especially the right. He also stumbled over small objects. He fell on three occasions and bruised the right knee quite badly. He experienced some difficulty in arising from a sitting position and in climbing stairs. No rectal or bladder symptoms and no numbness or tingling of the feet were noted.

Examination at this time revealed a definite level of sensory disturbance—corresponding to the fifth dorsal segment. All neurological findings were more marked on the right side. The tendon reflexes were increased, abdominal and cremasteric reflexes were absent, and the lower extremities were spastic. Dorsiflexion of the great toe with fanning of the other toes was elicited by the usual stimuli. There was definite quadriceps weakness

Lumbar puncture revealed reduced pressure, slow jugular response, clear fluid, cell count four, the presence of globulin and a negative Wassermann. No protein determination was possible.

Lipiodol injected into the lumbar spinal canal with the patient in an exaggerated Trendelenburg position stopped at the level of the seventh dorsal vertebra. The arrest of this material was not a true block, but one of false arrest as proved subsequently. This sometimes occurs and is due probably to adhesions to the arachnoid and the fine structures between it and the pia.[3] It is often difficult to distinguish between a true and false arrest of lipiodol.

Blood examination revealed no evidence of pernicious anemia and the Wassermann was negative.

Laminectomy, including the third, fourth, fifth and sixth dorsal laminæ, was performed on April 1, 1933. Inasmuch as the sensory level was quite definite at the fifth dorsal segment and the lipiodol stopped at the seventh dorsal, we felt that the operation should proceed from this region up. No tumor was visualized, however, and as the patient's condition on the table did not warrant further work being done, the operation was discontinued. The patient was discharged on April 23, 1933, and was unimproved.

On May 8, 1933, he was readmitted after having been at home for several weeks. During this time, progressive neurological findings were noted. Spasticity of the lower limbs was increased, being more marked on the right than on the left side. Root pains in both shoulders were severe enough to require morphine. The patient was unable to walk at all. Partial urinary incontinence was noted. The area of anesthesia below the fifth dorsal level persisted, with hyperthesia just above it. Spinal lumbar puncture showed xanthochromic fluid, with a cell count of four and greatly reduced pressure. Cisterno puncture revealed a clear fluid with moderate increase in pressure and a cell count of four. No protein determination was possible. Lipiodol injection through cisterno puncture showed complete block at the first dorsal level.

Decompression laminectomy and exposure of a fusiform intramedullary tumor at the level of the first dorsal vertebra was performed on May 13, 1933. A portion of the tumor was removed for microscopic examination and the report was glioma of the spongeoblastoma type.

There was gradual improvement in all neurological findings and except for moderate exaggeration of tendon reflexes of the lower extremity, as well as slight clonus, gait appears quite normal. Patient is a laborer and has worked whenever possible.

This case presented, first, partial block of the spinal fluid, and, later, complete block. The syndrome presented early and late was quite typical. In fact, we have seen so few "typical" cases that this one stands out as a paradox in being an exceptional example.

Symptoms depend upon the area of involvement in the cord, the rate of growth and the duration of compression. In a typical case, a history of slowly developing compression, well localized, with a definite level of sensory disturbance, increased reflexes, spasticity and weakness of the extremities, are noted. Lipiodol injection preferably through cisterno puncture with patient in a sitting position and subsequent x-ray should reveal a block.

Craig[1] has shown experimentally by inserting an artificial tumor (Horsley's wax) extradurally in dogs, that the spinal cord becomes adjusted to slowly increasing compression. This would explain the periods of remission often noted in cord tumors. He also showed that the spinal cord continues to function even when reduced in size by compression. If no degenerative changes take place it can return to normal. Therefore, if dysfunction persists after operation it is due to degeneration, the result of interference with the blood supply causing stasis, undernourished and edematous tissues. Spinal puncture should also reveal block and this should include protein determination, anything above 45 mgm. being abnormal; the blood examination should elimnate pernicious anemia and lues.

---

*Read before the St. Luke's Hospital Staff meeting, Duluth, October 18, 1934.

We assume that the lesion was intramedullary and probably glioma because of the findings indicating rather diffuse involvement of the cord. The spastic paraplegia indicated involvement of the lateral columns; the sensory level involvement of dorsal columns; while weakness of quadriceps suggested some involvement of anterior horn cells; clonus and dorsiflexion of the toe, involvement of pyramidal tract.

Tumors of the spinal cord include all tumors which may press upon the cord as well as those which originate in it. Therefore, they may arise from the bone, from the connective tissue, and blood vessels about the dura, from meninges, the nerve roots (intraspinal) and in the cord itself.

Anatomically the cord is about sixteen and one-half to eighteen inches long and about one cm. in diameter except at the cervical lumbar enlargements.[2] It is quite evident from a cross section that a tumor need not enlarge greatly before compression occurs.

The cord is movable laterally and can be rotated. It can be moved up and down in the canal about one inch. It is, therefore, capable of displacement.

As I stated before, this case is quite typical. We have seen several cases which we considered as being sclerosis of the spinal type, and which later proved to be cord tumor. We came to the conclusion that when we made a diagnosis of sclerosis of the cord involving the spinal segments this should be a cardinal symptom of cord tumor—at least it should be suspected.

I can remember another patient who came into our offices several years ago. He had had an operation for gallbladder disease and appendicitis several years before. Later he developed symptoms of multiple sclerosis, and rather than subject him to further hospital expense here we arranged for free hospitalization elsewhere. On the way down, he developed a transverse myelitis in the middorsal region and a diagnosis of cord tumor was made.

He was operated upon and what was thought to be a hemangioma was discovered. X-ray therapy was used and the patient recovered rather completely for about six months and then unfortunately developed root pains and recurrence of neurological findings. X-ray of the spine revealed multiple myeloma.

This case illustrates the need of x-rays and physical examination of specific areas of the spine; the need of continued observation to observe progressive symptoms; the fact that bony tumors often cause cord symptoms and that a prior history of abdominal surgery is quite common in cord tumors due to root pains in this area.

Another case that I recall, which was reported by Dr. C. E. Alexander as multiple neurofibrosarcoma, illustrates the necessity of continued observation for progressive neurological findings. This patient had a complete transverse lesion and was being observed in a hospital elsewhere and, since he did not improve, he finally consulted a miracle man—who wheeled him out to view the moon one night and to work his miracles.

On his return he was surprised to note that he was able to walk. At post mortem here, several years later, this was easily explained, when a walnut sized pedunculated neurofibroma of a posterior root was extruded outside the canal and this miraculously was extruded on the occasion of his trip to view the moon with the "miracle man."

Treatment is laminectomy with wide exposure of the cord, the common error being that exposure is not high enough. Extradural tumors and extramural intradural tumors can often be removed entirely with good results. Most often intramural tumors are of a glioma group and decompression is all that is accomplished. X-ray treatment in this group is beneficial.

The prognosis, of course, depends upon the removability of the tumor and is better in extramedullary non-malignant tumors than in intramedullary tumors. It depends upon several factors, namely, the nature of the growth, extent of the cord compression, duration of cord compression and the rapidity with which compression was applied; most of all whether degeneration of the cord structure has taken place, and here, as is well known, there is no regeneration. For this reason the prognosis of each case must be worked out on its merits. The prognosis in the extramedullary intradural tumors is more satisfactory than in any other large group of cord tumors.

In intramedullary tumors, as in our case, recovery is slow and seldom complete. In some cases the tumor is encapsulated and extrudes itself if the cord is cut over it. In others, as in our case, the tumor tissue invades the cord structure. It is quite surprising to note the number of cases which will recover sufficiently to be useful, though partially disabled, citizens for many years. Complete recovery is not to be expected and evidence of recurrence at sometime, even though delayed, should be anticipated.

Conclusions

1. One should suspect cord tumor if there is evidence of progressively increasing defect of nervous function limited to the spinal segments.

2. Operation, even if only a decompression, as in the case reported, often results in great improvement.

Bibliography

1. Craig, Winchell McK.: Experimental production of the syndrome of spinal cord tumor. Surg. Clin. North Amer., (August) 1933, p. 917. W. B. Saunders Company, Philadelphia, 1933.
2. Dana, Charles L.: Diseases of the spinal cord. Textbook of Nervous Diseases, Chap. 11, p. 200. William Wood & Company, New York City, Sept., 1915.
3. Mixter, William Jason: Spinal column and spinal cord. Chap. 3: Vol 12, p. 9. Dean Lewis' Practice of Surgery, W. F. Prior Company, Inc., Hagerstown, Maryland, 1932.

EDITORIAL

MINNESOTA MEDICINE
Official Journal of the Minnesota State Medical Association

Published by the Association under the direction of its Editing and Publishing Committee

EDITING AND PUBLISHING COMMITTEE
J. T. Christison, Saint Paul   A. S. Hamilton, Minneapolis
E. M. Hammes, Saint Paul   T. A. Peppard, Minneapolis
Waltman Walters, Rochester

EDITORIAL STAFF
Carl B. Drake, Saint Paul, Editor
W. F. Braasch, Rochester, Assistant Editor
C. A. McKinlay, Minneapolis, Assistant Editor

Annual Subscription—$3.00.   Single Copies—$0.25
Foreign Subscriptions—$3.50.

The right is reserved to reject material submitted for editorial or advertising columns. The Editing and Publishing Committee does not hold itself responsible for views expressed either in editorials or other articles when signed by the author.

Classified advertising—five cents a word; minimum charge, $1.00. Remittance should accompany order.

Display advertising rates on request.

Address all communications to Minnesota Medicine, 2642 University Avenue, Saint Paul, or 324 Fourth Avenue South, Minneapolis. Telephones: Nestor 1381 and Dupont 1013.

BUSINESS MANAGER
J. R. Bruce, Saint Paul

Volume 18   JULY, 1935   Number 7

New Tests of Hepatic Function

Of the large number of tests for hepatic function which have been proposed for clinical use, many are open to objection because of the cost and technical difficulty of the procedure, and also because the information gained in certain types of hepatic disease is not always sufficiently conclusive to repay the effort of doing the test. Two new tests which have recently advanced appear to be of particular promise, since they are easily performed and provide information which is not supplied directly by other tests now in general use.

The first of these tests, known as the Takata reaction, is used to detect the presence of extensive parenchymatous hepatic damage. It is done in very much the same manner as the colloidal benzoin test on spinal fluid, and, like this test, appears to depend upon the amount and character of globulin present in the fluid examined. The technic is extremely simple; various dilutions of serum are added to tubes containing a mixture of mercuric chloride and sodium carbonate in solution. In the presence of diffuse hepatic damage, flocculation occurs, a phenomenon which depends, according to Jezler, on the fact that if the proteins of the serum or ascitic fluid in question are altered, they lose their protective action on the colloidal solution of mercuric oxide formed by the interaction of previously mentioned salts.

It is a well established fact that the proteins of serum are altered in hepatic disease, as many investigators have shown. There is commonly a moderate reduction in the total protein and a reversal of the albumin-globulin ratio, the total globulin content being increased at the expense of the albumin fraction. In a series of cases studied at The Mayo Clinic, the correlation between such increases in the globulin content and positive Takata reactions has not been striking, but the latter test has been almost uniformly positive in the presence of advanced parenchymatous hepatic injury. Similar results have been obtained by Heath and King, Tumen, and numerous continental investigators. The lack of correlation between the globulin content and the positive Takata reaction is at some variance with the theory on which the latter test is based; possibly one can postulate some change in the structure of the serum proteins to explain such results. The clinical value of the test, however, seems quite definite. The blood serum or ascitic fluid in various types of parenchymatous hepatic disease produces flocculation, while negative results are obtained in metastatic maligancy of the liver and in other conditions in which the hepatic cells are not diffusely affected. The test promises to be of considerable value in the study of unexplained ascites, in the detection of the cause of gastro-intestinal bleeding, and in determining the nature of hepatic enlargement. It should be particularly useful in the latter field, since metastatic lesions of the liver may simulate cirrhosis very closely, and the commonly used bromsulphalein test does not differentiate the two conditions.

The second test is based on the ability of the liver to detoxify benzoic acid by conjugation with glycine to form hippuric acid. First devised by Quick, this test has now been used sufficiently to give a fairly good idea of its value. The method is simple and consists of gravimetric determination of the total hippuric acid in the urine for four hours after the oral administration of a dose of sodium benzoate. A reduction in the synthesis of hippuric acid indicates hepatic damage. Positive results have been obtained in portal cirrhosis, in splenic anemia, and in syphilitic hepatitis. In such cases the degree of hippuric acid excretion is quite closely correlated to the degree of bromsulphalein retention and to the changes in the serum proteins previously mentioned. In intrahepatic jaundice the test appears to give a better idea of the degree of hepatic damage than the more generally used galactose test, but its greatest field of usefulness appears to lie in the study of so-called surgical types of jaundice. In such cases, any test of hepatic function based on the excretory capacity of the liver is of little value, and tests which involve the metabolic functions of the liver are subject to a number of sources of error.

The hippuric acid test, however, is not open to any of the foregoing objections and appears to give reliable information as to the degree of hepatic damage present, as shown by studies at operation and at necropsy. It should be noted that the test does not propose to differentiate between obstructive and intrahepatic jaundice, but only measures the amount of functioning hepatic tissue as shown by the amount of glycine which the liver can furnish for the synthesis of hippuric acid. In clinical use it is necessary to be certain that renal insufficiency is not present, since renal lesions reduce the rate of elimination of hippuric acid and may give false positive tests. In a recently studied series, it seemed that the hippuric acid test gave a good idea of the actual state of the liver and its ability to withstand surgical procedures. While both positive and negative errors were noted in this group, the average accuracy was high.

These two tests should be a welcome addition to the armamentarium of the practitioner whose laboratory facilities are limited and who wishes to obtain information with regard to the state of the liver at a minimal expenditure of money and effort.

Albert M. Snell, M.D.,
The Mayo Clinic,
Rochester, Minn.

Canucks and Yanks Meet

The Canadian cities at the Head of the Lakes, Fort William and Port Arthur, entertained (May 25 to 29) a joint meeting of the Ontario and Manitoba medical societies. Invitations were extended to many Minnesota and Wisconsin doctors to attend, and not a few took advantage of this fine international gesture. From Duluth, Drs. E. L. Tuohy, W. A. Coventry, K. R. Fawcett, D. L. Tilderquist, and T. J. O'Leary of Superior, Wisconsin, made up one party; Drs. T. L. Chapman, A. E. Hedberg and E. F. Loewen made up another; Drs. B. A. Smith and S. S. Shannon of Crosby were observed in the gathering, and there were likely others missed by your scribe.

The program was well planned and Dr. McCullough's local committee functioned with unusual success. A group meeting at the American Head of the Lakes is being planned for this autumn.

The North Shore boulevard drive is now in almost perfect condition. Few drives of such length combine a like degree of grandeur, charm and historical interest.

An unusual interest has been evidenced this year in the A. M. A. meeting in conjunction with the Canadian Medical Association at Atlantic City. The medical, as well as the social and economic problems, are so identical that it is only natural that closer and closer relationships should be cultivated.

It is noteworthy that a revival of the automobile industry (with flashier, brighter and more economical models) finds more and more doctors combining attendance at medical sessions, far and near, with vacational treks. This gives scant comfort to the railroads, and, despite an earnest effort on their part towards increased speed and economy, up to date the automobile combines a flexibility and comfort that not only gets the traveler to his destination but renders him and his family mobile units when they get there.

E. L. T.

Great Leader

The death of Dr. Herman M. Johnson of Dawson brought to a close a picturesque and unique career. It also marked the end of a great era in medical organization in Minnesota.

When Dr. Johnson first became a power in Minnesota, the Minnesota State Medical Association was a weak, loosely linked aggregation of county scientific societies. It held no significance whatever in legislative councils. It assumed no responsibility for leadership in the protection of the public health. The door was wide open to any form of quackery or medical preying upon the public in Minnesota.

When Dr. Johnson died at his home in Dawson last month, he left a powerful and closely knit organization of physicians. He left a model of basic science legislation on the statutes for the protection of the public against medical fraud, a piece of legislation which he has personally protected against infringement at each session of the legislature since its passage in 1927. He left united front among his fellow physicians in the state against interference of unqualified agencies and persons between the physician and his patient, against deterioration of medical standards, against crippling of the physician in his constant search for more knowledge and better equipment in the treatment of disease.

All this has come about in a period of approximately ten years and if it can justly be said to be the contribution of any one man, certainly major credit must go to Dr. Johnson. It was he who taught the doctors of Minnesota the effectiveness of organization. It was he who showed them how to use it.

Dr. Johnson died at the end of a strenuous and highly important legislative session. A report of the effective work of his committee was assembled and presented to the House of Delegates at the annual meeting of the Association in Minneapolis, last month. At the very moment of his death he was making plans for further negotiations with relief officials of the state.

Dr. Johnson will be sadly missed in Minnesota. But the organization which he envisioned and helped to establish will go on. It is shaped and ready, now, to attack new problems. The vigor and single heartedness with which it fills its new rôle will be a sufficient testimonial to the memory of "Herman."

TRIBUTE TO DR. HERMAN M. JOHNSON

We who have lived for over half a century are due from now on to find ourselves more and more lonely with every passing year. Those whom we have known and loved, with whom we have been associated in work and relaxation and from whom we have received encouragement in hours of defeat and disappointment, in whom we have reposed confidences and from whom we have sought counsel when the road ahead seemed uncertain are taking leave of us, one by one. The circle is becoming smaller, the line thinner. That is the penalty we pay for living on, the price the Reaper exacts for forbearance.

For nearly thirty-four years Doctor Herman was my friend. When I was a young man of eighteen he became my mentor. He never failed me. He never broke faith. He never gave me bad advice. He never refused assistance when it was needed—in fact, he gave it without being asked.

He was the very soul of honor. If there was any alloy of base metal in his character, I did not find it. I never knew him to make a promise he did not keep. He was direct, outspoken, sincere. If he ever lacked in tact, it was because he was so honest that he preferred to tell the truth even when it hurt, rather than to keep silent and have his own conscience accuse him of insincerity.

He was a man of strong convictions. What he believed, he believed sincerely; what he felt, he felt deeply. To him there was never any uncertain shading between right and wrong.

He had keen perception and an analytical mind. The ability to note symptoms and diagnose causes, to trace effects to their source, which made his professional career notable and in many respects exceptional, he carried into fields outside that of medicine. Ofttimes I have been with him when, as with a surgeon's skill, he dissected the social body and probed for the causes of its ailments. When so engaged he showed that mingling of courage and caution that characterizes the true scientist, whether he works in the library, the laboratory, or the operating room.

While Herman was not without honor in his own community, I doubt whether those who saw him every day realized fully the high esteem in which he was held in the world outside, and specially among the national leaders of his proession. Indicative of the wide recognition acorded him and of the large circumference withn which he was known, is the fact that I first eard of his death, not from the telegram which received from Dawson, but from a group of minent physicians meeting in Washington.

The old home town will never be quite the ame again. One figure I will miss on Main treet, in his office and in places of business—he figure of a modest man who carried his honrs lightly, of an honest man who spoke canlidly, of a friendly man who was really interestd in his neighbors and associates, of a truly hristian gentleman who without professing any articular piety exemplified in his daily life his aith and conviction that "it is better to give than o receive."

Editor's Note: The above tribute, written by Congressman heodore Christianson and sent to Mrs. Herman Johnson, is eproduced because it tells so well what one of Dr. Johnson's lose friends thought of him.

In Memoriam

Herman M. Johnson

1874-1935

Dr. Herman M. Johnson, surgeon and mayor of awson, Minnesota, died at his home from gall-bladder omplications following a week's illness on June 19, 935.

Herman M. Johnson was born at Pelican Rapids, innesota, sixty-two years ago. He received his medcal degree at the University of Minnesota and served is internship at the Norwegian Deaconess Hospital, Minneapolis. After one year's practice at Grafton, North Dakota, he moved to Dawson, Minnesota, in 1903. Following a brief period of practice he took postgraduate work at Johns Hopkins medical school, returning to Dawson, where he has since practiced.

Dr. Johnson was appointed chairman of the Committee on Public Policy and Legislation of the Minnesota State Medical Association in 1924, a chairmanship which he has held since that time except for the year 1926, when he was president of the State Medical Association. The passage of the Basic Science Law by the State Legislature was the result of his efforts more than those of any other one man. His activities on the Legislative Committee during the past ten years in preventing ill advised legislation have been even more valuable. Since 1929 Dr. Johnson has been a State Delegate to the American Medical Association and his experience in medical organization was nationally felt.

Besides being a member of the Camp Release District Medical Society, the State and American Medical Associations, Dr. Johnson was a member of the American College of Surgeons and last May was made an honorary member of the Hennepin County Medical Society.

Dr. Herman M. Johnson

Dr. Johnson is survived by his widow, three sons, Harold, Wilhelm and Reginald, and a brother, Dr. Carl Johnson, with whom he practiced.

M. J. Miller

1910-1935

Dr. M. J. Miller and his wife tragically met death May 30, 1935, when the automobile in which they were riding went off the road and toppled into the Mississippi River near Grand Rapids, Minnesota.

Dr. Miller was the son of Dr. H. A. Miller of Fairmont. He was born at Fredericktown, Missouri, November 30, 1910, and graduated from the Waseca high school in 1928. His premedical course was taken at Western Union College at Le Mars, Iowa, and he obtained his medical degree from the University of Minnesota in March, 1935. His internship was completed at the Minneapolis General Hospital January 1 of this year and he served as resident physician at St. Luke's Hospital in Saint Paul for the first four months of the year.

On January 13, Dr. Miller married Florence Vrantzen of Minneapolis and the couple moved to Pine River the middle of May. Dr. Miller had thus been engaged in practice but two weeks when the accident terminated the career of both himself and his wife.

MEDICAL ECONOMICS

Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association

B. J. Branton, M. D.
J. A. Moga, M. D.

W. F. Braasch, M. D., Chairman

J. C. Michael, M. D.
A. N. Collins, M. D.

Great Meeting

The 82nd Annual Meeting is in progress at the Minneapolis Auditorium as this issue goes to press.

In size and scope and scientific variety this meeting greatly outstrips any in the history of the organization.

Registration at this early date shows that there is an undoubted place for a great annual meeting of sectional rather than of state interest in the Northwest.

High lights of Council and House of Delegates proceedings will be in these columns next month. Watch for them.

Trend of Legislative Opinion

Several interesting observations recently made by Dr. E. H. Cary of Texas, chairman of the Legislative Committee of the American Medical Association, are deserving of special note.

The Committee found, for instance, that a "definite impression prevailed in the minds of the president and others that the body of the profession as represented in the membership of the American College of Surgeons was committed to sickness insurance."

In talking with official Washington and particularly with representatives of the President's Committee on Economic Security, the Committee made a special effort to point out that the facts were otherwise, and to correct that unfortunate impression. (Note below Dr. Cary's report of a new policy with regard to these matters announced by the College of Surgeons.)

The final report of the President's Advisory Committee on Health Insurance had not even yet been written when Dr. Cary reported to the House of Delegates. It awaits the conclusions of the chief statistician.

Health Insurance

A legislative year which saw the first co
certed attempt to enact legislation for compu
sory health insurance is about to end with con
pulsory, contributory health insurance still u
realized. It is no nearer, certainly, than it wa
a year ago and popular feeling is not now
ardent as it was for sweeping changes in o
social structure.

The iron was hot six months ago. When th
opportunity comes to strike again it is altogeth
probable that the iron will have cooled in th
interval.

Compulsory sickness insurance will not
pressed in this or very likely in the next sessio
of congress, the Committee was told. It is pos
sible that a bill may be presented, however, as
sort of "trial horse" to get the public reactio

Legion Keeps Faith

Dr. Cary's Committee was particularly please
to report that its conference and coöperatio
with representatives of the American Legio
have borne fruit.

In a series of meetings the Legion repeatedl
assured the Committee that it did not and woul
not advocate further hospital building for vet
erans beyond caring for special needs, jointl
agreed upon, here and there.

The large number of bills introduced for car
of veteran patients did not emanate from th
American Legion and were not sponsored b
Legion representatives.

Problems in Medical Relief

No definite changes appeared to the Com
mittee to be contemplated immediately in th
plan for medical care of the indigent.

The question of what agency is to distinguish, in the future, between the employables and the non-employables among those on relief s apparently still under discussion.

The United States Public Health Service might be assigned the task according to the Committee. A very elaborate plan has been worked out which, even under sympathetic administration, might well aid in promoting and establishing a health insurance system.

Officials were not in agreement as to whether this would, in fact, be the solution, however. In another department, still another plan which eaves out the public health service and assigns the task to local agencies was suggested. This plan seemed to the Committee to be far less disturbing.

Conclusion: "As a Committee we are hopeful of the future but do not deny that the next two years will require of you your active support in defending the principles you have outlined and the ideals which you cherish."

The College of Surgeons Conforms

A change of policy regarding the solution of economic problems has been adopted by the Board of Directors of the American College of Surgeons, Dr. Cary announced to the House of Delegates of the American Medical Association at Atlantic City.

As a result of the recent conference of representatives of the College of Surgeons and of the American Medical Association, the College announced that it would hereafter leave the solution of economic problems to organized medicine and its various branches and that it would in the future devote itself exclusively to the special problems to which it is dedicated.

The medical profession as a whole will undoubtedly applaud this action of the College of Surgeons. It will be recognized as logical and proper and a guarantee against unfortunate misunderstandings in the future as to the solidarity of the profession.

It is to be hoped that other special societies will adopt similar policies.

Important!

(The following interesting announcement came from SERA headquarters in St. Paul just as this issue went to press.

The Schedule of Monthly Earnings printed below it is taken from a pamphlet just issued by the Works Progress Administration in Washington called "Preliminary Statement of Information for Sponsors," Circular No. 1.

Further information about this new development in the handling of relief in Minnesota will be printed in these columns next month.)

A change in the method of handling the relief of indigents in Minnesota and in the balance of the nation is impending and with that change will come a sizeable—perhaps drastic—reduction in the amount of medical aid granted through County Relief Offices.

In the new employment program, which will be called "Works Progress Administration," employed persons now on relief rolls will be given jobs on socially desirable and feasible projects at a definite wage rate.

These persons will not receive any type of supplementary aid from the present relief administration. Among other things this means that families receiving benefits of the new employment program must care for their own medical needs out of the wages which they earn. Such persons, if they need medical care, have the same status as any other private patient of the physician serving them. The County Relief Office will be unable to assume any responsibility for the needs of relief clients who obtain jobs under the new employment program.

In a word, this means that physicians who have formerly been receiving authorizations to care for indigents in their community may expect a drop in the number of such authorizations quite directly in proportion to the speed with which employed relief clients are placed on WPA projects.

The following table shows the established rates of earnings for use in preparing project estimates.

Schedule of Monthly Earnings

	Counties in which the 1930 population of the largest municipality was—	Region I	Region II	Region III	Region IV
Over 100,000	Unskilled work	$55	$45	$35	$30
	Intermediate work	65	58	52	49
	Skilled work	85	72	68	68
	Professional and technical work	94	79	75	75
50,000 to 100,000	Unskilled work	52	42	33	27
	Intermediate work	60	54	48	43
	Skilled work	75	66	62	58
	Professional and technical work	83	73	68	64
25,000 to 50,000	Unskilled work	48	40	29	25
	Intermediate work	55	50	43	38
	Skilled work	70	60	56	50
	Professional and technical work	77	66	62	55
5,000 to 25,000	Unskilled work	44	35	24	22
	Intermediate work	50	44	36	32
	Skilled work	63	52	48	42
	Professional and technical work	69	57	53	46
Under 5,000	Unskilled work	40	32	21	19
	Intermediate work	45	38	30	27
	Skilled work	55	44	38	35
	Professional and technical work	61	58	42	39

Regions include the following States:

I. Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming.

II. Iowa, Kansas, Missouri, Nebraska, North Dakota, South Dakota, Delaware, District of Columbia, Maryland, West Virginia.

III. Arkansas, Kentucky, Louisiana, Oklahoma, Texas, Virginia.

IV. Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Tennessee.

New Plans

One of the outstanding features of the recent meeting of the House of Delegates of the American Medical Association at Atlantic City was the Special Report read by Doctor Leland of the Bureau of Medical Economics. Most of his suggestions were described in the Medical Economics columns of the last number of Minnesota Medicine. In response to requests made by the House of Delegates at the special session last February, he made a thorough study of nearly two hundred different experiments in medical services conducted by county medical societies throughout the United States. He found that the experiments were so diverse and varied so widely that not only classification, but enumeration was difficult. In this report, however, complete enumeration is made insofar as possible, as well as tentative classification. He found that it was not possible to make all county medical society plans conform to a single pattern, but that they must be adjusted to local necessity. To quote from his report, he states that:

"These plans involve in general the following steps:

1. Study of local medical facilities to determine the nature and extent of medical problems for which adjustment is needed.
2. Definition of persons or income groups for whom medical benefits should be provided.
3. Method of determining patient's ability to pay.
4. Amount and nature of medical service to be provided.
5. Organization and coördination of community medical services, supplemented by new units of administration when necessary.
6. Systematic movement of applicants for medical care.
7. Manner of presenting a plan to the public and method of securing members.
8. Method of making collection or receiving payments for medical care.
9. Method of remunerating physicians for

their services to patients receiving benefits under the plan.

0. Administrative details.”

A short résumé of many of the county society plans was included, and would give any society contemplating any new set-up an idea as to what plan their group might be able to use. He calls attention to some of the dangers involved: (1) The possibility of stimulating counterfeit plans by irresponsible people, (2) Danger that he public may be educated to the false belief hat good medical care can be furnished for too ow sums. Even the most enthusiastic advocates of compulsory sickness insurance have been forced to recognize that it is not possible o furnish a good medical service for less than $30 per person per year, or somewhat in excess of $100 per family per year. (3) The danger of adopting an undesirable plan which it would be impossible to change later, and which may become a pattern for wider plans in the future.

Copies of the Special Report are available through the offices of the State Secretary, and it is to be hoped that every member will be interested enough to read this report thoroughly.

Report of the Judicial Council

Another outstanding feature of the meeting of the House of Delegates was the report of the Judicial Council, presented by Dr. George E. Follansbee. Under the heading of “Improved methods of administering the principles of medical ethics,” Dr. Follansbee called attention to the fact that the Judicial Council in the past has made recommendations which have resulted in improved conditions under which medical service is made available to the public. Reference especially is made to discussions and pronouncements of all kinds of *contract practice,* whether by individual or grouped physicians, hospitals, dispensaries, teaching institutions, or insurance or industrial companies. It is apparent that the very democracy of our existing set-up may become involved unless our county and state societies rapidly develop to meet adequately local situations arising from the professional activities of a small but thoughtless or indifferent section of their members. If the societies will not exercise their prerogative or discharge their duties in this connection, it will become advisable to extend the disciplinary functions now resting in the county society to the state association and possibly to the national administration.

“Ordinarily,” says this report, “under present by-laws of county, state and national associations, procedure to correct an unethical practice must be instituted in the county medical society by the preferring of charges, which, in practice, is left to some individual who feels aggrieved. Few individuals feel it their personal responsibility to prosecute a breach of ethics that affects them but little personally, though it may affect the profession of medicine in a major degree. The institution of charges by an individual in such cases of general concern might very probably amount to professional suicide. Seldom does any individual desire to place himself on his own initiative in the position of prosecutor for the benefit of the profession as a whole. In so doing he is likely to bring upon himself the unfriendliness and antagonism or colleagues often in influential positions.”

Impartial Courts

“Society has found that it needs a system representing society as a whole, of grand jury investigation and indictment, a public prosecutor, and an impartial court with the right of appeal to higher courts. Medicine in this age needs a similar system for enforcement of its ethical and economic principles. Such a system of medical jurisprudence is needed most and would be applicable in the larger county medical societies. The body bringing the indictment and the prosecutor would lose their personal identity in their representation of the medical profession as a whole. No stigma, but rather honor, would attach to them.

“The Principles of Medical Ethics, while followed by the large majority of the profession, are looked upon only as a theory by some in the profession and considered—if considered at all—by many not in the profession as simply a uniform to be worn while ‘on parade.’ When people, laymen as well as members of our profession, realize that the Principles of Medical Ethics are the basic principles of honest, fair dealing and that their observance is necessary to the best interests of the whole people, laymen as well as members of the profession, medical practice will have taken a long step upward.

Medicine will have more dignity and authority, and people will be better served."

It is obvious that if violations of medical ethics, particularly in relation to various forms of contract and allied practice, can be justly and adequately dealt with, organized medicine will have solved one of its greatest problems. It will have made a distinct advance.

Teaching Economics

Out of 71 Class A medical schools of the country 60 already have established or are planning to establish compulsory medical economics courses for their students.

This is the figure reported to the House of Delegates at Atlantic City by the Philadelphia medical society in a resolution urging that the Council on Medical Education and the Bureau of Medical Economics persist in their efforts on this score until medical economics courses have been established in all medical colleges in the country.

It is interesting to note, in this connection, that, through the efforts of the Minnesota State Medical Association's Committee on University Relations and particularly of President W. A. Coventry, a course in medical economics will be required for the first time next year for Minnesota medical students.

Dean R. E. Scammon has appointed a committee composed of representatives from the State Medical Association and the faculty of the Medical School to arrange for such courses during the ensuing year.

The importance of this departure in the formal preparation of young men for the practice of medicine cannot well be overestimated.

It is a recognition of the fact that the young physician needs more than a scientific education to make a place for himself in this complicated modern world.

The object is not to make a business man out of the doctor. It is to make doctors who comprehend clearly the place of medicine, its obligations as well as its prerogatives in our social structure.

New Society

The Dakota County Medical Society is now in the process of organization.

It enters the affiliated societies of the Minnesota State Medical Association as the 34th member of the group.

The following physicians become charter members of the society: Dr. J. A. Sanford, Farmington; Dr. G. F. Walter, Farmington; Dr. L. D. Peck, Hastings; Dr. L. R. Peck, Hastings; Dr. L. S. Burns, South St. Paul; Dr. K. E. Stein, Lakeville; and Dr. H. A. Fasbender, Hastings.

Dr. Stein is transferring his membership from the Scott-Carver Society and Dr. Fasbender from the Hennepin County Society.

Organization in Dakota county has been under consideration for years. The eight physicians who are now organizing their society are to be congratulated upon their enterprise and their community spirit.

The county medical society is the most important unit of medical organization and also the best guarantee of good medical service in any community.

Minnesota State Board of Medical Examiners

St. Paul Woman Sentenced to Five Years at Shakopee on Manslaughter Charge

Court Dismisses Similar Charge Against St. Paul Physician

Re: State of Minnesota *vs.* Emelie Arnold
Re: State of Minnesota *vs.* George H. Burfiend, M.D.

On June 19, 1935, the Honorable Richard D. O'Brien, Judge of the District Court, sentenced Emelie Arnold, 50 years of age, to a term of not to exceed five years at the State Reformatory for Women at Shakopee. Mrs. Arnold had entered a plea of guilty on June 10, 1935, to a charge of manslaughter in the first degree following the death of Miss Edna Beaman, seventeen years old, Dawson, Minn.

Mrs. Arnold was placed under arrest May 14, following the death of Miss Beaman at the West Side General Hospital on May 13. At the time of her arrest Mrs. Arnold gave a statement to the County Attorney's office in which she implicated Dr. Burfiend. Dr. Burfiend was placed under arrest following the signing of a complaint by the father of the girl. Dr. Burfiend waived his preliminary hearing, was held to the District Court under bond of $5,000, which was furnished. He entered a plea of not guilty and a trial was had before a jury and Judge O'Brien. Mrs. Arnold testified for the State against Dr. Burfiend. The girl who accompanied Miss Beaman to the home of Mrs. Arnold and to the office of Dr. Burfiend, also testified for the State. Medical testimony was introduced to show that death resulted from general peritonitis. There was testimony that the deceased had been recently pregnant and that the uterus had been recently emptied. When the state rested, the defendant made a motion to dismiss, which was granted by the Court. The Court was of the opinion that Mrs. Arnold and Elsie Toombs, witnesses for the State, were both accomplices and under the law no conviction could be had on the uncorroborated testimony of the accomplices. The case was tried for the State by Mr. James F. Lynch and Mr. William Desmond of the County Attorney's staff. Dr. Burfiend was represented by Mr. Thomas McMeekin.

OF GENERAL INTEREST

Dr. Halbert L. Dunn, director of the University of Minnesota Hospital, will leave the University July 15 to become chief statistician in the division of vital statistics in the Department of Commerce in Washington. Dr. Dunn became superintendent of the University Hospital in 1932, succeeding Paul W. Fesler, who resigned to become head of the Wesley Memorial Hospital at Northwestern University, Evanston, Illinois. Dr. Dunn graduated from the University of Minnesota in 1922, later became associate professor in the School of Hygiene at Johns Hopkins University, and later head of the Department of Statistics at the Mayo Clinic.

Dr. Edward J. Engberg, Saint Paul, has been appointed by the Governor to the State Board of Health to fill the vacancy left by the death of Dr. Helen H. Heilscher of Mankato.

UNIVERSITY NEWS

At the June meeting of the Board of Regents of the University several changes were made in the faculty of the Medical School. Dr. Richard E. Scammon, Dean of Medical Sciences at the Medical School for several years since his return from the University of Chicago, has been honored with a distinguished service professorship. Dr. Harold S. Diehl, director of the Student Health Service at the University since 1921, has been appointed to succeed Dr. Scammon as Dean of Medical Sciences. Drs. L. A. Buie, T. B. Magath, Wallace H. Cole and Arthur A. Zierold were promoted to full professorship and Drs. L. T. Austin, J. A. Bargen, V. S. Counseller, C. F. Dixon, P. S. Hench, H. Montgomery, L. M. Randall, H. D. Smith and R. M. Snell from assistant to associate professorship. Drs. L. A. Brunsting, H. K. Gray, F. J. Heck, R. M. Hewitt, C. W. Mayo, L. E. Brickman, G. J. Thompson and R. M. Lovell of Rochester were promoted from instructorship to assistant professorship. Mr. Ray M. Amberg, Saint Paul, connected with the University Hospital since 1922, was named acting director to succeed Dr. Halbert Dunn, who has accepted a government appointment at Washington.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Annual Meeting

The combined meeting of our State Association with the Medical Section of the American Association for the Advancement of Science in the metropolis of the state, drew a record attendance—a record likely to stand for several years. The guest speakers drew enthusiastic audiences and the various demonstrations and exhibits proved instructive.

Next year the annual meeting will be held in Rochester, Minnesota, with Dr. W. W. Will of Bertha as president. Dr. W. A. Coventry remains in office until the first of the year. The House of Delegates elected Dr. E. G. McKeown, Pipestone, vice president, and Dr. C. W. Rumpf, Faribault, second vice president. Our efficient secretary, Dr. E. A. Meyerding, was reelected and Dr. W. H. Condit, Minneapolis, was again chosen treasurer. Drs. Giffin, Sogge and Adams were re-elected councilors in their respective districts, and Dr. E. J. Simons, of Swanville, was chosen to fill Dr. Will's unexpired term as councilor in the Seventh District.

Dr. J. T. Christison, of Saint Paul, was-elected A.M.A. delegate, and Dr. E. A. Meyerding his alternate. The Council will appoint an A.M.A. delegate to fill the vacancy left by Dr. Herman Johnson as national delegate.

The Women's Auxiliary will have the following officers until the next annual convention Mrs. F. J. Elias, Duluth, president; Mrs. Ernest M. Hammes, Saint Paul, president-elect; Mrs. J. F. Norman, Crookston, first vice president; Mrs. W. B. Roberts, Minneapolis, second vice president; Mrs. B. R. Karn, Ortonville, third vice president; Mrs. A. C. Baker, Fergus Falls, recording secretary; Mrs. R. W. Josewski, Stillwater, treasurer; and Mrs. N. S. Dungay, Northfield, auditor.

Mississippi Valley Medical Society

The first annual meeting of the newly formed Mississippi Valley Medical Society will be held at the Loncoln-Douglas Hotel, Quincy, Illinois, on Oct. 2, 3, 4, 1935. A most practical program of intensive postgraduate instruction by eminent clinicians has been arranged. A preliminary program may be obtained from the Secretary, Harold Swanberg, M.D., 211-224 W. C. U. Building, Quincy, Illinois.

Minnesota State Board of Medical Examiners

The organization of the Board of Medical Examiners for the year beginning June 1, 1935, is as follows:

Dr. F. H. Magney (Duluth)—President

Dr. A. Fritsche (New Ulm)—Vice President

Dr. J. F. Du Bois (Sauk Center)—Secretary-Treasurer. (Office of Secretary—524 Lowry Medical Arts Bldg., Saint Paul)

Dr. A. W. Adson (Rochester)
Dr. C. L. Sherman (Luverne)
Dr. Ivar Sivertsen (Minneapolis)
Dr. Max Alberts (Saint Paul).

The new member of the Board, Dr. Max Alberts, was appointed by the Governor to take the place of Dr. E. J. Engberg (Saint Paul) whose term of appointment expired May 1, 1935. Dr. Engberg deserves the gratitude of the public as well as the medical profession for his efficient and devoted service as Secretary of the Board for the past five years.

Range Medical Society

The Range Medical Society met at Eveleth, Minnesota, May 23, when the following program was furnished by the staff of the More Hospital:

1. Review of Cases of Pulmonary Tuberculosis—Dr. M. L. Strathern.
2. Bronchitis, Pneumonia and Empyema—Dr. W. M. Akins.
3. Malignancy of the Lungs—Dr. F. R. Kotchevar.
4. Blastomycosis of the Lung, Silicosis, Pulmonary Abscess and Gangrene—Dr. E. N. Peterson.
5. Case Reports—Dr. C. W. More.

Andrew Sinamark, M.D., *Secretary*

Northern Minnesota Medical Association

Program

Monday—August 12, 1935
Duluth

Morning

Registration.
Fractures of Neck of Femur.
M. S. Henderson, Rochester, Minnesota.
Pelvic Inflammatory Disease.
John H. Moore, Grand Forks, North Dakota.
Selected subject.
L. R. Parson, Elbow Lake, Minnesota.
Lung Abscess.
E. N. Peterson, Eveleth, Minnesota.
Selected subject.
B. I. Derauf, St. Paul, Minnesota.
New Concepts of Calcium Therapy.
Richard M. Johnson, Minneapolis, Minn.
Luncheon and Business Meeting

Afternoon

Radiotherapy for Inflammatory and Malignant Conditions.
A. U. Desjardins, Rochester, Minnesota.
Fractures of the Ankle.
Owen W. Parker, Ely, Minnesota.
Selected subject.
J. C. McKinley, Minneapolis, Minnesota.
The Management of Diabetes Mellitus in General Surgery.
Clarence Jacobson, Chisholm, Minnesota.
Sterility, Its Etiology and Treatment.
James J. Swendson, St. Paul, Minnesota.
Report of the American Heart Association.
R. L. Nelson, Duluth, Minnesota.

Evening

Treatment of Pneumonia by Artificial Pneumothorax.
Edgar T. Herrmann, St. Paul, Minnesota.
Treatment of Acute Empyema.
Herbert A. Carlson, Minneapolis, Minnesota.
The Management of Malignant Disease of the Mouth and Adjacent Structures.
Gordon B. New, Rochester, Minnesota.
Medical Economics.
Dr. R. G. Leland, Director, Bureau of Medical Economics, Chicago.

Tuesday, August 13, 1935

9 A. M. Board steamer Noronic for trip up north shore of Lake Superior, returning to Duluth at 2 P. M. A five course dinner on the Noronic to be followed by addresses.
Chief speaker: Dr. Preston Bradley, Pastor of Peoples Church, Chicago, and President of the National Izaak Walton League.
Other speakers on the program:
Dr. W. R. Bagley, Duluth.
Dr. Irving Badeau, Brainerd, President Northern Minnesota Medical Association.
Dr. W. A. Coventry, Duluth, President Minnesota State Medical Association.
Dr. T. J. O'Leary, Superior, President Wisconsin State Medical Association.
Dr. R. G. Leland, Chicago.

O. O. Larsen, M.D., *Secretary,*
Detroit Lakes, Minnesota.

Redwood-Brown County

The annual meeting of the Redwood-Brown County Medical Society was held at the Dakota Hotel, New Ulm, May 15. Annual elections were held and the following officers named: President, Dr. A. P. Goblirsch, Sleepy Eye; Vice President, Dr. C. A. Saffert, New Ulm; Secretary-Treasurer, Dr. Carl J. Fritsche, New Ulm; Censor for three years, Dr. E. J. Wohlrabe, Springfield; Delegate to 1936 State Convention, Dr. J. H. Vogel, New Ulm; Alternate Delegate, Dr. F. H. Dubbe, New Ulm.

Southern Minnesota Medical Association

The 1935 meeting of the Association will be held at Austin, Minnesota, Sunday afternoon and evening, and Monday, August 25 and 26.

Contributions to the program have been requested on the subjects of heart disease, gastric and duodenal disease, contagious diseases, mastoiditis, arthritis, prostatic hypertrophy and endocrine disorders, by Dr. N. W. Barker, Rochester, Chairman of the Program Committee.

AMINOACETIC ACID

The Council on Pharmacy and Chemistry reports that from the many studies reported on aminoacetic acid it is quite apparent that its use in the treatment of myasthenia gravis and muscular dystrophy of either the progressive or the pseudo-hypertrophic type offers the patient greater hope than any form of treatment heretofore employed. Its use in other conditions cannot as yet be recommended on the basis of the meager investigations thus far reported. The Council declared aminoacetic acid acceptable for New and Nonofficial Remedies. (J. A. M. A., April 6, 1935, p. 1239.)

PROCEEDINGS *of the* MINNESOTA ACADEMY OF MEDICINE

Meeting of April 10, 1935

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, April 10, 1935. The President, Dr. A. R. Hall, in the Chair.

The meeting was called to order at 8:15 p. m. There were fifty-seven members and one guest present.

Minutes of the March meeting were read and approved.

The President announced that the Executive Committee had discussed and approved a suggestion of having a social meeting of the Academy in June, and that Dr. Wilcox had offered his summer home at Rippleside for the meeting place. A motion was carried that such a meeting be held and that the Academy thank Dr. Wilcox for his offer.

The scientific program followed.

GROSS STRUCTURAL CHANGES IN THE ADULT HEART AND AORTA AS SEEN IN THE ROENTGEN RAY FILM AND THEIR CORRELATION WITH CLINICAL AND AUTOPSY FINDINGS

Alfred Hoff, M.D.
Saint Paul

Dr. Hoff read his Inaugural Thesis with the above title. Numerous lantern slides of cases were shown. (To appear later in Minnesota Medicine.)

Abstract

The heart shadow contour gives valuable information in definitely diseased large hearts because with enlargement there is usually an accompanying change of form.

Although it merely reveals evidence of gross structural change which is usually impossible of correction, it does aid materially in the establishment of exact diagnosis and accuracy of prognosis which is so essential to the intelligent care of cardiac patients.

When estimating the significance of a shadow heart contour, the factors which normally influence its size and shape must be given due consideration. Such factors are: height, weight, race, age, the position and contour of the diaphragm and structural deformities of the thorax. Also, the divergency of the roentgen ray must be overcome by using a six foot film distance.

An attempt is made to illustrate by the shadow contour of the heart and great vessels alone, the changes occurring as a result of disease and to correlate this picture with the clinical and autopsy findings, when possible, without resorting to fixed cardiac measurements.

The cases shown are such as have been under personal observation for variable periods of time.

The normal shadow heart contour is explained with regard to the structures forming its left and right contours. These structures are so-called bows; the right auricular and the ascending aorta forming the right border, and the aortic knob, pulmonary artery, left auricle and left ventricle forming the left border.

General opinion usually holds, however, that, when the pulmonary bow or the left auricular can be definitely identified, the heart is abnormal.

Gross structural changes in the heart and aorta affecting these various bows independently and jointly, are shown by lantern slides, with cases, giving the history, clinical and postmortem findings.

1. The contours of compensated and decompensated mitral stenosis are illustrated and the mechanism of their production explained.

2. Moderate and marked pulmonary bow prominence, indicating a dilatation of the pulmonary artery and usually regarded as typical of a patent ductus Botalli, may be caused by a mitral stenosis and Ayerza's disease, while a patent ductus may exist with only a slight increased prominence of the pulmonary arc. Illustrative cases with autopsy findings are given.

3. Combined valvular disease. The type of contour is determined by the preponderating lesion present. Illustrative cases, with autopsy findings, are shown in combined mitral and aortic stenosis; combined mitral, aortic and tricuspid stenosis, and the triple combined with pericardial adhesions; also, of mitral stenosis associated with severe grade of hypertension.

4. Pericarditis with effusion. Illustrative case with autopsy findings, showing condition shortly after onset and subsequent massive effusion due to tuberculosis.

5. Contours of supracardiac shadow. Cases shown of (1) syphilitic aortitis; (2) aneurysm of ascending aorta with autopsy findings; (3) diffuse dilatation of the aortic arch, caused by atherosclerosis and syphilis, with autopsy findings.

The importance of the clinical history and progress with the impossibility of a differential diagnosis from the shadow contour alone, is stressed, in atherosclerotic and syphilitic dilatation of the aortic arch.

An attempt has been made to correlate, without resorting to set cardiac measurements, the roentgen-ray shadow contour of clinically observed large hearts in adults, with the clinical symptoms and autopsy findings, in an effort to appraise its merits in the diagnosis of the cardiac cases selected.

1. A knowledge of the significance of such contours permits the clinician to obtain rapid information with fluoroscope alone, and, by the use of the orthodiagram, a quick permanent record both of the heart shape and size.

2. It is particularly useful in the combined types of valvular lesions, where auricular fibrillation and congestive heart failure have changed the characteristic murmurs and obscured the type of heart failure.

3. The fluoroscopic screen permits of a rapid and accurate method by which a dilatation of the aortic arch or the pulmonary area can be determined.

4. It offers an accurate method for determining changes occurring in the size and shape of the cardiac outline during the progress of disease, being especially useful in pericarditis with effusion.

5. In determining cardiac function, it offers little help.

6. It may be said that the roentgen-ray shadow heart contour is a valuable accessory method in the diagnosis and care of heart disease when combined with the clinical symptoms, findings, and the electrocardiogram.

7. In those painful types of heart disease where, often, all methods of exact diagnosis fail, it is well to remember the advice of the elder Dr. Janeway, who, in discussing angina pectoris, said that, when he "disregarded the patient's story and relied solely on his own calm judgment, he usually made a mistake."

I wish to acknowledge my indebtedness to Dr. John F. Noble and Dr. Kano Ikeda for the autopsy record of these patients.

Discussion

Dr. A. R. Hall (Saint Paul): I think we will all agree that this is one of the most instructive and nicely executed theses we have had. The correlation of the clinical history, the physical findings, the electrocardiogram, and autopsy findings with the different shadows of the heart contour brings out very well the diagnostic evidence which may be obtained from an x-ray study of the heart.

Dr. Carl B. Drake (Saint Paul): I enjoyed Dr. Hoff's presentation very much. I was particularly interested in hearing Dr. Hoff state that it is impossible to make a definite differential diagnosis between an arteriosclerotic arch and a leutic aortitis from the x-ray shadow alone. I recently saw a patient whose ascending aorta appeared markedly widened in the x-ray film, but whose Wassermann was negative. Inasmuch as the Wassermann is not 100 per cent reliable, it is therefore not possible to make an accurate differential diagnosis in all cases.

Dr. Hoff referred to the bulge in the left border of the heart shadow which is usually considered typical in a case of mitral stenosis. I had always thought this bulge of the shadow was caused by a dilated left auricle. There is good reason to believe that this is not the case and that this prominence is the result of hypertrophy and dilatation of the right ventricle. I would be much interested in knowing Dr. Hoff's interpretation of this prominence in cases of mitral stenosis.

Dr. S. Marx White (Minneapolis): This very meaty presentation by Dr. Hoff tempts one to go perhaps too far afield, but, in discussing it, I should like to present two concepts and two methods I have been using with a great deal of satisfaction, to myself at least. They have helped in making more accurate the diagnosis of conditions in the heart and aorta, and in watching their progress. The first concept is that, in the regions where the heart and great vessels are covered by pericardium, the outline is in fact that of the pericardium. If one retains that concept it leads directly and at once to search for evidence of effusion or other material within the pericardial sac. True it is that when the pericarial sac contains no excessive amount of exudate or tissue, the cardiac outline itself is revealed. The second concept which seems to me of importance is that the so-called right border of the aorta as seen in the mediastinal shadow above the heart is practically never the right border of the aorta but has as a complement the shadow of the right innominate vein and superior vena cava. This venous shadow lying to the right of the aortic sinus may be very narrow or thin, and, if the veins are not dilated, the outline seen corresponds practically to the right border of the aorta. If, however, the innominate vein and superior vena cava are over-distended their shadow determines the form taken by the outline on the right, and may make up a considerable part of the width.

I am particularly in accord with Dr. Hoff's conservatism in the interpretation of these x-ray silhouettes so far as they contribute to our diagnosis of valvular lesions. The x-ray shadow reveals certain changes in the size and outline of the great vessels and of the chambers of the heart, but we do not see the valves. The changes seen may lead to inferences as to the valvular lesion causing the distention of a chamber or a vessel, but inferences are not diagnoses, even though the x-ray silhouette quite often makes up a large part of the data on which a diagnosis is founded. I emphasize this caution because it is too common for the roentgenologist to make a diagnosis stating a valvular lesion rather than the size and type of cardiac outline, and too common for the patient, the hospital clerk, intern or resident, and the physician to accept such laboratory diagnoses without giving them only a part in the summation on which a true diagnosis should be based.

In addition to the concepts outlined, there are two methods which I have found to be very useful. The first method is the use of the fluoroscopic shadow which, though somewhat simpler and not as perfect in its interpretability as the orthodiagram, takes much less time and gives valid records of progress from time to time in the same case. I had Dr. J. B. Carey devise a frame on which a fluoroscopic screen could be drawn out to a distance of five feet from the target. Drawing it out and making a careful outline with a glass pencil, then transferring that to tracing paper, gives a very good permanent record of the heart outline and size; also it saves the time necessary for an orthodiagram and the expense of an x-ray film. The second method to which I wish to refer was brought to this region by Dr. L. M. Rigler. It is a method of obtaining the width of the shadow of the aortic arch, by putting in the esophagus a bolus of thick barium-containing material. It gives a very useful impression of the actual aortic width measured from the left side of the aortic arch to the left side of the shadow of the barium-filled esophagus. The parallax is relatively constant, and the method very often gives usable evidence as to the diameter of the aorta at that point.

Dr. C. B. Wright (Minneapolis): This thesis emphasizes the importance of routine x-ray examination of the heart. Many men feel that the orthodiagraph is more accurate than the six-foot plate. Both procedures give more information than either one alone. Repeated examination over a period of years may bring out interesting changes in appearance of the heart outline which are of value. How long it takes to develop the configurations characteristic of the lesion is important if we are going to use the shadowgraph to make a diagnosis of an early lesion. There is not much definite information on this point. The same author referred to by Dr. Drake, I think we mean Polesvki, claimed that as the right heart enlarges the heart rotates to the left and one sees the shadow of the right ventricle on the left side. This makes the lower part of the straight line on the left. As the left auricle enlarges it enlarges posteriorly and to the right and, where it is much enlarged, one sees the shadow of the left auricle extending out to the right side of the heart. This may become very large and be confused with a mediastinal growth.

Dr. Hoff (in closing): I was very much interested in Dr. White's comment about the aorta and in Dr. Drake's question.

At Wenckebach's clinic in Vienna, Dr. Herman Rösler, who is now at the Massachusetts General Hospital, taught that as the left aurricle hypertrophies it becomes posterior, while the hypertrophy of the right ventricle rotates the heart to the left on its axis and what we see on the left border is the conus pulmonalis and not the left auricle.

The left auricle may be so enlarged as to be seen on the right heart border; so that there may be two curves, (1) the right auricle, above; and (2) the left auricle, below.

NON-OPERATIVE TREATMENT OF LOCALIZED PERFORATIONS OF THE DUODENUM*

Owen H. Wangensteen, M.D.†

Abstract

Perforation is one of the tragic complications of ulcer. Its occurrence demands immediate operation for closure of the perforation. The immediate and great disability, together with the intense rigidity of the abdominal muscles, serves to identify it. True surgical shock does not attend perforation. In cases observed some hours after the occurrence of perforation, the rigidity of the abdominal mucles is frequently considerably less, owing to the dilution of the irritant by secretion from the serous cells of the peritoneal surfaces.

The simplest operative procedure is the best, viz., mere closure of the perforation. Circumstances which will compel the performance of gastroenterostomy or gastric resection are most unusual. With the postoperative employment of gastric siphonage, slight obstruction, occasioned by the closure of an indurated pyloric ulcer, may be well controlled.

The factors which determine the mortality of perforation are (1) the delay intervening between its occurrence and closure of the leak. Cases operated upon within the first six hours are subjected to least hazard. After 12 hours there is a steadily mounting risk, which, after 24 hours, becomes formidable. (2) The size of the perforation. (3) The status of digestion at the time of perforation. (4) The general physical condition of the patient.

This report concerns four patients with late duodenal perforations, one of which was due to trauma (kick by horse), and the other three to ulcer; all healed under conservative management by suction applied to an inlying duodenal tube. The ulcer perforations were essentially late cases in which some localization had probably occurred; at the time of admission they presented diffuse abdominal findings and their general physical status was not good. They were not the mild "formes frustes" type of case described by Vaughn and Singer. Two of the patients recovered following the development of a subphrenic abscess. The third died 14 days after entry into the hospital of diffuse peritonitis. At the time of her admission the perforation had been present 28 hours. The temperature was 102.2° F. and the pulse rate 134. The traumatic case exhibited gas around the cecum and kidney, indicating that there had been gaseous escape from the retroperitoneal duodenum. He convalesced satisfactorily following the institution of gastric and duodenal suction.

During the past four years, four patients with the clinical picture of perforation due to ulcer, in whom no gas could be demonstrated below the diaphragms on an x-ray film taken in the erect posture, have been treated conservatively without operation. All came early, but it was felt that failure to demonstrate free gas in the peritoneal cavity indicated that the perforation had already become sealed off. These patients were all known to have ulcer, and in 1927 I had closed a perforation for one of them. An additional patient with a "formes frustes" type of perforation of more than 24 hours' standing, has also been successfully treated without operation.

Studies on pneumoperitoneum by Drs. Paine, Rigler, and the writer indicate that a very small amount of gas below the diaphragm may be visualized on a roentgen film exposed with the patient erect. Frequently 3 to 4 cubic centimeters may be definitely seen; occasionally 20 cubic centimeters has to be injected before it may be demonstrated between the liver or stomach and the diaphragm.

Dr. Bowers and the writer have established perforations in the antrum of the stomach in a number of laboratory animals (unsutured incisions one centimeter in length). If these punctures are made when the stomach is empty, it is survived in 100 per cent of the animals; if done when the stomach has food in it, the mortality is 86 per cent.

These observations suggest that the first therapeutic procedure to be employed in the treatment of perforation due to ulcer should be evacuation of the stomach contents with a duodenal tube. Then the perforations should be closed as soon and as simply as possible, continuous suction being employed after operation to keep the stomach empty. It is a good plan to take a film in

---

*Complete paper to be published elsewhere.

†From the Department of Surgery, University of Minnesota.

the erect posture in any patient suspected of having ulcer perforation. In my experience, patients exhibiting no gas below the diaphragm may be treated safely by conservative means. Patients with the "formes frustes" type of perforation coming after 24 hours may also be treated conservatively without anxiety. Patients coming late with diffuse findings, but in whom the occurrence of localization is probable, are in my opinion more secure with conservative treatment than with operation. Patients with late perforation in whom leakage is probably still occurring, as indicated by the presence of a large pneumoperitoneum, should be subjected to operation despite the enormous risk, granting that their physical condition permits.

Discussion

Dr. Arnold Schwyzer (Saint Paul): Dr. Wangensteen's observations are very interesting. One of the points he raised was that he had never seen shock in perforated ulcer. This may surprise some men, but it is a fact, at least in the early cases. The late Dr. Deaver made this always a very strong point in differentiating between acute pancreatitis and perforating ulcer. In the latter the pulse is even bounding, while in an acute pancreatitis there is great shock with weak pulse and an agonizing distress, the patient sensing impending death. An important point brought out by Dr. Wangensteen's report is that a case of gastric or duodenal perforation can be quite advanced and beyond surgical help when we see it, and still we should not make an absolutely hopeless prognosis.

I recall a case of a man thirty-two years old on whom I operated in 1902. Three or four years before, he had been desperately ill from an acute perforation of an ulcer. Dr. Wheaton, who was then professor of surgery, was consulted but he declared the patient too far gone for any surgical attempt. The abdomen was like a drum and distended to its limits. The patient, however, did not die but improved slowly. When he later came to us he had been suffering from constant distress, retention and, at one time, a very severe hemorrhage. A gastroenterostomy relieved him and he lived for thirty years, dying two years ago from what was reported to be high blood pressure. The reason I mention this case is this: When we opened the abdomen three or four years after that severe illness, a picture presented itself which remained vivid in my memory. There were diffuse adhesions, especially of the omentum to the anterior wall of the peritoneal cavity, and hundreds of minute white nodules like a miliary tuberculosis. But, remembering the history of the case, we felt that this was due to a perforation of an ulcer and on microscopic examination were able to verify it. In some of the nodules we found a vegetable fiber, in others an oval vegetable cell, and in some nothing was seen. This was a pseudo-tuberculosis caused by the seeding in of gastric, or rather duodenal, content.

Thus we have here a case of perforation of an ulcer into the free abdominal cavity. The patient, an otherwise strong man of 32 years, though not operated upon and probably because he was not operated upon at that desperate time, made the grade and lived 30 years after our gastroenterostomy in comfort, about 34 years after the perforation of his pyloroduodenal ulcer into the free peritoneal cavity.

When a patient gets a perforation, especially of the duodenum, the amount of gastro-intestinal content is of course a considerable factor. The stomach is known to destroy the bacteria in the chyme, but it does not destroy all the bacteria. The coli group, the cholera bacillus, typhoid bacillus, and the bulk of the other germs are rendered harmless, but the staphylococci, albus, aureus, flavus, et cetera, are not destroyed. I saw cultures of staphylococcus aureus given a patient with a gastroenterostomy, and the contents of the stomach, after plugging the opening for a proper time, contained the staphylococci in large quantities. All this refers to a normal gastric juice with normal or high acidity.

Dr. C. B. Wright (Minneapolis): Dr. Wangensteen's suggestion that a perforation of the stomach when it is filled may be more dangerous and increase the risk, suggests to me one of my earliest cases in practice, a servant girl seen in 1904. She had had "neuralgia" of the stomach. Shortly after eating a hearty breakfast she started to walk upstairs, suddenly cried out in pain and fell in complete collapse. I saw her very soon, within thirty minutes. She apparently was in shock, very pale, rapid thready pulse, cold perspiration, and had a subnormal temperature. She was sent to the hospital and operated on within the first two or three hours. She had an anterior wall perforation as large as a dollar and the entire content of the stomach was in the peritoneal cavity. Dr. Ringnell operated and closed the perforation with mattress and purse-string sutures and washed out the peritoneal cavity with gallons of salt solution. The stomach contents showed meat, potatoes, and bread and butter, and undoubtedly could not all have been eliminated. The abdomen was closed and she recovered, although her convalescence was slow and complicated by phlebitis in one leg, an abdominal wound infection, and right-sided pneumonia. She is still living. She has never had any trouble with her stomach but has since had a gallbladder operation.

I approve Dr. Wangensteen's position in these late perforations of the duodenum. I have seen patients, operated on late, with very small perforations with localized peritonitis, who died, who might have recovered had they not been operated on.

Dr. A. R. Colvin (Saint Paul): The recital of Dr. Wangensteen's cases shows again the great variability of the reaction of individuals and individual tissues under apparently similar conditions. I was glad that Dr. Wangensteen always advised suturing a perforation into the free peritoneal cavity. Just whether the perforation occurs into the free peritoneal cavity, we cannot say. However, this is the rule, so that, other conditions being favorable, we should always operate in cases seen early.

I recall a case in which I sewed up some fifteen or twenty wounds in the small intestine due to bird-shot. When I got through I was rather impressed that probably it was unnecessary to sew up any of them; there was no leakage and they would perhaps have closed themselves after the fashion of valves. I operated on a young boy one time who was shot through the stomach; in the x-ray the bullet was shown back against his spine. At operation I found only the anterior opening in the stomach and was unable to find the posterior opening. That boy got well. The opening in the posterior wall of the stomach took care of itself.

One of my first experiences in perforating ulcer was in a young man who presented the picture of general peritonitis, almost pulseless, with blue lips and finger-tips, and seemingly in extremis. His symptoms began thirty-six hours before I saw him, and I concluded it would be useless to do anything. His poor old mother stood by and looked so appealingly at me that I told her if she wanted to take a 1 to 1,000 chance I was willing to take it also. We sent the boy to Ancker Hospital. Not being able to say whether his peritonitis was due to a perforated ulcer or a ruptured appendix, I made a right gridiron incision, and air and fluid came out with a hissing sound. An upper abdominal incision was then made and a perforation of the duodenum sutured; another incision was then made in the left lower abdomen and drainage instituted in all three openings, and, although a lot of fluid was obtained through all three openings, there must have been still a lot left; and there was no postoperative drainage. The boy got well and I operated on him about fifteen years later, doing a gastroenterostomy for an obstructing ulcer.

One of the points brought out by Dr. Wangensteen is that the peritoneal cavity takes care of some of these perforated ulcers, or, rather, that it walls off and isolates the extravasated material; and Dr. Schwyzer's case illustrates the amount of stomach contents that the peritoneal cavity will take care of. There was practically no postoperative drainage in the case reported above and the peritoneal cavity still contained a lot of extravasated material and yet the boy got well. Dr. Wangensteen's cases prove that the perforation becomes sealed up at times and that a peritoneal abscess may result and be opened later. If one knew that a localizing process would occur, it would be very rational to let it localize and open later, but they are not all quite so fortunate as Dr. Wangensteen's cases were. I operated on a man for perforated ulcer and sutured it. He did not do so well, and while I was speculating as to the nature of the postoperative complication, a subdiaphragmatic abscess ruptured into a bronchus and he recovered. It would have been much better if I could have located the abscess and opened it. In another exactly similar condition I "beat Nature to it" and opened the subdiaphragmatic abscess, and that patient also got well. While Dr. Wangensteen's cases are interesting and very instructive, I feel as he does, that when we see a perforation early it should be operated upon at once.

That a perforating ulcer may not cause so very much trouble is illustrated by a case at Ancker Hospital. While I was attending a conference at the hospital, an intern came in saying that a man was in a bad condition from a perforated ulcer. When seen by several of the staff about fifteen minutes later, we were all impressed with the fact that the man's condition was not so severe as the intern had indicated. X-ray showed quite a lot of air beneath the diaphragm. I discussed operation with him but he refused, and in a short time he left the hospital perfectly well. Another similar case presenting about the same picture was not operated; he later developed a subdiaphragmatic abscess and was operated with success.

I feel that these cases will have to be dealt with individually and according to the experience and judgment of the individual surgeon.

Dr. R. T. LaVake (Minneapolis): Dr. Wangensteen emphasizes, in his paper, the characteristic rigidity of the abdomen with its bearing on diagnosis. I would like to report a case that shattered my feeling of confidence in my ability to diagnose a perforation under all conditions.

This woman in the sixth month of her pregnancy developed a pre-eclamptic toxemia and for the last three weeks of the sixth month was in the hospital under intensive treatment. During this time she complained of desultory epigastric pain that we considered a manifestation of the toxemia, as she had never had the pain before in her life and had never given any evidence of previous gastrointestinal disturbance. Due to the precariousness of her toxic condition and her earnest desire to get a live child, we did not subject her to gastrointestinal studies. At precisely the beginning of the seventh month of pregnancy the membranes ruptured spontaneously and she delivered, normally, a live premature baby. During gas anesthesia, toward the end of delivery, the anesthetist said she had stopped breathing. Under artificial respiration she snapped out of this condition and, after delivery, was put back to bed in apparently a normal condition. This was about 4 p. m. The next morning she complained of a bit of abdominal discomfort, which she said had bothered her through the night, although the special nurse had noticed nothing unusual. Her abdomen was moderately ballooned but there was no rigidity and we thought it was a gas retention problem, a condition not very unusual after labor. About 2 p. m. that day she had acute abdominal pain followed by marked distention. No rigidity could be made out and the condition was attacked with enemas. She went from bad to worse and died just thirty-six hours from the time of her delivery. The diagnosis was mesenteric thrombosis.

At autopsy it was found she had a perforation in the duodenum. The lesser sac of the peritoneal cavity had a shaggy lining looking almost like an abscess cavity. The greater sac was inflamed and full of intestinal contents. I believe this rupture occurred under the anesthetic during her delivery.

I have never reported this case because it is so unusual that I did not think it would help anyone. The absolute lack of the type of rigidity that Dr. Wangensteen so correctly emphasizes, threw me off the track and the possibility of perforation was not even suspected. This case suggests that epigastric pain in toxemia of pregnancy warrants extensive gastrointestinal studies and should not be positively ascribed to the toxemic condition.

Dr. Wangensteen (in closing): What Dr. Schwyzer had to say of the encapsulated nodules in the peritoneal cavity interested me very much. In the patient operated upon remotely in this series, there was a similar finding. We were uncertain whether these nodules were the vestiges of an old healed peritoneal tuberculosis or the residual evidence of the escaped duodenal content, until the microscope showed the presence of the foreign body reaction described by Dr. Schwyzer.

I was happy to find that my experience coincides with that of Dr. Schwyzer as it relates to the factor of shock in perforation. In the perforations of gastric and duodenal ulcers which have occurred in the hospital or in other patients coming early for closure of a perforation, I have never seen so-called surgical shock with quickening of the pulse rate and depression of the arterial pressure. Invariably, such patients are found to be severely prostrated because of the agonizing distress, but shock in the true sense, in my experience at any rate, does not occur. It is interesting that despite a studied effort, extending back over eight or nine years, to teach our junior and senior medical students that the complication of shock does not attend perforation, more frequently than not in their examinations they indicate that shock does occur. For a period of about three years during which we have given oral examinations to the seniors, I have suggested to those giving such a reply that they write me when they see surgical shock accompanying perforation of an ulcer. To date, no description of such an occurrence has been received.

These answers of the students do not originate de novo. The explanation is to be found in the antiquated information to be found in many of our best surgical textbooks. When the authors of texts will write of what they know and have themselves observed and cease to repeat the ancient errors copied from older texts, this and other similar errors will no longer be perpetuated.

The problem of what is best to do with some of these late perforations can undoubtedly be better settled by trial of different methods than by discussion. In the late cases of more than 24 hours' duration, the results on the whole are so bad by any form of management that a selection of cases for varied types of treatment would appear to be fully justified. The uniform experience in the closure of late perforations into the free peritoneal cavity has been that the risk is formidable. When the majority of writers relate that the mortality for perforations of more than 25 hours in their experience has been between 50 and 70 per cent, and a few other writers are able to report small series of almost uniform recovery, it is immediately apparent that they are dealing with different types of cases. The latter are undoubtedly the so-called "formes frustes" of Vaughn and Singer.

There can be no debate about the early case. Closure of the perforation should be done immediately. Those patients presenting the clinical picture of perforation in which no gas can be demonstrated below the diaphragm on the roentgenogram exposed with the patient in the erect posture, in my experience, can be safely treated without operation. The "formes frustes" patient coming after twenty-four hours, relating a story of perforation but exhibiting minimal findings, and revealing only minimal amounts of gas below the diaphragm, may also be treated safely with conservatism. The patients who come late and exhibit diffuse findings but manifest some signs of localization as indicated by (1) the presence of a relatively small amount of gas below the diaphragm, (2) the presence of a dense shadow in the upper right abdomen—it is my impression that the interests of these patients is better served by conservative treatment, of which suction applied to an inlying duodenal tube is the most important item. Cases who come late, in which there is no evidence of localization and in which escape is probably still occurring from the perforation as manifested by a large amount of gas under the diaphragm—such patients, if their general condition warrants, must be subjected to operation despite the risk. When the physical status of such patients is poor, no good can come from operating upon them.

Dealing with perforations in the gastrointestinal canal is essentially a problem in bacteriology. The relatively anaërobic character of perforations due to ulcer in the stomach or duodenum makes this potential tragedy considerably less dangerous than perforations of a similar size lower in the intestinal canal. It is to the development of bacteriological aids that we must look for help in our anxiety to manage more successfully late perforations due to ulcer.

MEGAKARYOCYTOMA

Dr. Martin Nordland (Minneapolis) reported a case of Megakaryocytoma in a woman fifty-six years of age, with operation and recovery.

The meeting adjourned.

R. T. La Vake, M.D.
Secretary.

TRANSACTIONS *of the* MINNEAPOLIS SURGICAL SOCIETY

ANNUAL SYMPOSIUM ON CANCER

Thursday, April 4, 1935

The President, Dr. Martin Nordland, in the Chair

(Continued from June, 1935, issue)

RGANIZATION OF HOSPITAL SERVICE FOR DIAGNOSIS AND TREATMENT OF MALIGNANCY

F. A. Olson, M.D.

At the Cancer Symposium held by the Society on pril 5, last year, an attempt was made to correlate d evaluate all available information regarding the currence of cancer in private practice in Minneapolis d the means at hand for its treatment.[13] It was ought out that in Minneapolis alone, out of 5,176 eaths, there were 729 deaths reported from cancer in 32, and now we know that there were 822 in 1933—5 in 1934 (two a day). Further, it was conservatively timated that approximately 1,000 cases of malignancy ere being treated annually in the hospitals of the ty, 70 per cent of which were cared for by private ysicians. It was further shown, and this is from r. Rector's report, that, taking the State as a whole, ere were 3,199 cancer deaths in a typically representa-ve year, or one every two and three-quarters hours. e find that, in a thoroughly normal year, 3,505 pa-ents with malignancy were seen at the Mayo Clinic—38 of these coming from the state of Minnesota. ence, it is evident that the State and our immediate cality is no exception to the rule that cancer is rapidly ecoming one of the most serious problems, if not the ost serious problem, the medical profession has to eal with today.

Those of you who attended the symposium, "Cancer Curable," held by the American College, last Octo-er, in Boston, may have heard Dr. Martin[8] report on 50,000 cancer deaths in the United States and Canada or 1933. At the same time he reported from the ollege records of 1932, 1933 and 1934—24,440 cancer urvivals of cures of five years or more.

The control of the cancer situation should remain bsolutely within organized medicine. This fact pre-ents itself as a great challenge to the profession and specially those interested on its surgical side. To llow the problem to drift, presents just one more ntering wedge for governmental usurpation and con-rol.

Rector[12] says: "Cancer is a problem for the medi-cal profession and the hospitals, and the interest of the ntelligent public should be restricted to strengthening he resources of these two groups. How long the lay activities can be held to this purpose depends on the wisdom and alacrity with which the profession and the hospitals' meet this situation."

Pack,[11] in his discussion of the organization of a tumor clinic in a general hospital, states: "Cancer is a major health problem which must be met by the boards of managers and the medical staffs of the large general hospitals. No such hospital today can be considered fully efficient unless a well-organized cancer service exists within its doors."

Organization

Two national organizations have sensed the battle for a long time. The American Society for the Control of Cancer was organized and has been active since 1913. As you know, this body is simply fact finding and educational in scope. The second is the American College of Surgeons whose "Committee on the Treatment of Malignant Diseases" was formed in 1922. (Two other committees of the College have functioned almost as many years, the Committee on Archives of Malignant Diseases and the Committee on Bone Sarcoma.) The personnel of the original Committee on Treatment of Malignant Diseases is sufficiently noteworthy to bring to your attention. The chairman was R. B. Greenough of Boston, who had served continuously until his election to the presidency, last October; A. C. Broders of Rochester, Burman of Baltimore, Crile of Cleveland, Crowell of the American College, Duane of Boston, Ernst of St. Louis, Finney of Baltimore, Lee of New York, Lynch of San Francisco, Miller of Baltimore, Pancoast of Philadelphia, Wells of Chicago, and F. C. Wood of New York. To date, this committee has presented the most constructive national program of attack upon the problem. Committee chairman, R. B. Greenough,[7] said in October, 1930: "The plan for organization of Cancer Services and Cancer Clinics in General Hospitals throughout the country, which is outlined by the Committee on the Treatment of Malignant Diseases, marks a definite step forward in providing more adequate service for cancer patients."

A few of this committee's recommendations[2] I would like, briefly, to present to you, with special reference to our local conditions and problems. These recommendations have been published from time to time, the first appearance being in *Surgery, Gynecology and Obstetrics,* for October, 1930, or about four and a half years ago. They pointed out that the resources available for diagnosis and treatment of cancer cases at that time were:

I. Cancer Institutes
II. Cancer Research Hospitals
III. Cancer Hospitals
IV. Cancer Clinics in General Hospitals
    A—Complete Cancer Clinics
    B—Diagnostic Cancer Clinics.

It is this last type of tumor clinic that seems best suited as a base for a starting point and which, in possibly a modified form, could easily be made a valuable beginning of better things in each one of our larger private hospitals.

I. Of the *cancer institutes* equipped with a hospital and laboratories for research there will never be more than a few on account of the great cost. Examples are: Memorial Hospital, New York; New York State Institute for the Study of Malignant Diseases at Buffalo; The Cancer Committee of Harvard University, with its hospitals and laboratories, Boston; Barnard Free Skin and Cancer Hospital, St. Louis; and the Radium Institute in Montreal.

II. *Cancer research laboratories* are, also, very expensive and their numbers necessarily are limited. Examples: The Cancer Research Laboratory of Columbia University; The Rockefeller Institute, New York; and Sprague Memorial Institute, Chicago. They are dependent on large endowments and devote their efforts solely to research.

III. *Cancer hospitals:* These are state supported or heavily endowed hospitals, such as the one seen in Massachusetts and the Cancer Institute on our campus. Several of these are coming into existence as departments of already established hospitals.

IV. *Cancer clinics:*

A—A Complete Cancer Clinic.

According to the recommendations, a complete cancer clinic requires:

1. Organization of a staff of specialists.
2. Adequate diagnostic and therapeutic facilities.
3. Adequate record system.
4. Clerical assistants.
5. Social service workers.

To summarize, such a complete cancer clinic in a hospital should have:

Personnel

a—Chief of Staff, preferably a member of the the Surgical Staff.

b—Representatives from:

1. General Surgery, including Gynecology.
2. X-ray therapy experts.
3. Radium therapy experts.
4. Pathologist skilled in tumor diagnosis.
5. Internist.
6. Representatives of all specialties as consultants.
7. Record clerk, follow-up system and social service workers.

Material Resources:

a—Instruments and laboratories for all us diagnostic methods.

b—Pathological laboratory service.

c—Operating services and other ordinary h pital facilities.

d—Adequate service of x-ray and radium.

Meetings:

a—Daily, weekly, or semi-weekly sessions the clinical staff and a monthly joint me ing with the entire staff.

B—Diagnostic Cancer Clinics:

Groups under this heading could be formed in a reasonably large hospital or group of hospitals wh complete service, such as mentioned above, is not available. Weekly meetings should be held at fir possibly in conjunction with or in nature of an ext special clinico-pathological conference. Practition could be encouraged to bring patients to such a co ference where group judgment might be obtained a where the practitioner would later be free to conti the care of the patient as he saw fit.

The Committee of the American College recomme that the personnel of such a diagnostic clinic be follows:

1. A director, preferably a surgeon with some fa ities of leadership, together with good techni training, knowledge of the subject and enthusias
2. One or more surgeons.
3. Pathologist.
4. Roentgenologist.
5. Internist.
6. Gynecologist.
7. Dermatologist.
8. Urologist.
9. Gastro-enterologist.

A suitable staff of consultants should be chosen, gether with such clerical assistants as are usually c tainable in the average hospital. The house st could be used to advantage in many ways. It is ea to see how even a flexible and rather loosely knit c ganization, such as this, could be *incorporated* a hence be in position to receive bequests with the p pose of later establishing a complete cancer or tum clinic such as outlined in the recommendations of t College.

It is certain that once a working group even of th simple nature was organized in the average mediu sized or larger hospital, it would not be abandoned b would continue to grow. As W. W. Keen, in one his favorite expressions, would say—"Now, that I ha seen it I cannot be without it."

The clinico-pathological conference so ably conduct by Dr. C. R. Drake, at the Swedish Hospital, is a go example of a foundation upon which such a diagnos tumor clinic could be built up with very little alterati and enlargement. Soon it could easily meet every r quirement laid down by the College, as a fully approv cancer clinic.

Advantages

he establishment of a diagnostic tumor clinic such set forth would seem like a logical first step. Engement of the scope and additions could be made m time to time as a matter of natural growth. ne might maintain that the set-up, as outlined by College, is too advanced for us at this time. Almost hospital has the personnel and equipment for such ervice. A little more concentrated attention by the nagement and inauguration of a bit more special vice by the Staff group, as outlined, would greatly gment the efficiency of the hospital in the campaign inst carcinoma. That the professional prestige of hospital would be enhanced is only too evident.

he effect of the American College program has been matic. In 1920, there were fourteen cancer clinics the United States. The February, 1932, report wed:

Approved—American College of Surgeons, 100.
Recommended for approval—58.
In process of organization—185.

y February, 1935:

Approved by the American College of Surgeons—181.
Not ready to report—58.
Signified their contemplation of formation—80.

r. R. T. Pack[11] says that in his opinion there can er be too many diagnostic clinics in any city.

hile this movement towards the establishment of diagnostic tumor clinics has spread over many ters, as yet it has not influenced the managements staffs of any of the private hospitals in Minneolis forcibly enough to bring action. The hospitals[6] ducting approved cancer clinics in our section of country are: University Hospital, Minneapolis; yo Clinic, Rochester; Northern Pacific Benefit Asiation Hospital (provisional), St. Paul.

ontana has one, the Murray Hospital, at Buttte. wa, North Dakota and South Dakota have none.

he inference from this report would indicate that re is plenty of opportunity for further development this district.

would like, briefly, to mention a few more of the ny advantages that could accrue from a well orgaed tumor clinic:

etter service:

he patient would receive a more comprehensive dy and more efficient treatment.

ducational value:

To the Public:

t has been the experience, where tumor clinics have en established, that patients begin to come in earlier d earlier for examination, in other words, at a time en the diagnosis is more difficult and treatment sier, rather than when the diagnosis is easy and the atment most difficult. The prevailing feeling of pesnism in the community has been found to diminish proportion to the activity of the diagnostic group.

b. *To the Hospital:*

Frequent reports could be made to the Staff as a whole.

Better records and follow-up would be obtained.

Incidentally, the College has made a most comprehensive set of record blanks for this purpose: some eighteen different forms for the various types and locations of malignancies.

c. *To the Profession:*

The diagnostic skill, both clinical and pathological, of any group working under such an arrangement would rapidly be increased by the greater experience in actual observation and study of all the tumors and pathological material passing through the hospital. Bloodgood,[1] in an article appearing in the *Canadian Medical Association Journal* for June, 1933, touches on this point. He says, "The profession has never been taught the essential facts in the diagnosis and treatment of carcinoma, *in the earliest,* the *most innocent* and the *most difficult* stage to diagnose."

Further, such a diagnostic tumor clinic could instill a working knowledge of the effects of radiation therapy in the immediate group and the professional staff as a whole that would tend to dispel the present pessimism and lethargy as regards cancer prognosis which is everywhere quite evident among medical men. It is axiomatic that the interest of anyone is stimulated and maintained in any field in direct proportion to his *knowledge, skill,* and *training* in the subject.

X-ray and radium therapy is the most highly specialized form of treatment known to medical science today. In the past it has been and is now shrouded in more than a small amount of mystery. The profession has often not availed themselves of its benefits as readily, persistently, and early enough to produce the maximum benefit to their patients.

More and better palliative care, both as regard irradiation and other special treatment would be made available and carried out for the inoperable and the otherwise hopeless cases. I have reference to the analgesic effect of x-ray and radium, chemo-therapy with heavy metals and the use of dilaudid, etc.

Past experience in irradiation has always shown that, as technic and equipment are improved, end-results improve in a direct ratio. It is to be hoped that with the installation (one now being actually under way) of the new 40,000-volt constant potential, x-ray machine which gives a beam closely approaching the Gamma ray of radium, this city will see less and less of the hopeless feeling in regard to cancer in both the profession and laity. It has been stimulating to me, and I am sure it will be to many of you, to realize that soon a weapon of such power, in the war on cancer, will be available to the private patient of the ordinary practitioner in Minneapolis. A machine of 400,000-volt constant potential develops the same length of beam as one of 650,000 volts with pulsating energy. In this connection, I quote a statement by Mudd, Emery, Meland, and Costolow:[10] "At the end of three years of experience at the California Institute of Technology and the treatment of 285 patients, we are of the opinion that heavily filtered radiation at 600,000 volts or higher seems to offer better possibilities in the treatment of certain types of deep-seated cancer than irradiation at substantially lower voltages. The results compare favorably with those produced by a 4 gm. radium pack."

We, of the Surgical Society, would like to believe that the installation of such expensive x-ray equipment has been stimulated materially by the agitation we have created by our several Annual Cancer Symposia. Again, we would modestly like to believe that the "Tumor Registry" instituted last year in the city of Saint Paul may have derived some stimulus from this same agitation.

Bibliography

1. Bloodgood, J. C.: Jour. Can. Med. Assn., 30:600, 1933.
2. Committee on Treatment of Malignant Diseases: Report, Surg., Gyn., Obst., 51:570, 1930.
3. Cutler, Max, and Scott, Hugh: Reprint from Veterans Administration Ed. Hines Jr. Center, Hines, Ill., on "Organization of a Tumor Clinic."
4. Cutler, Max: Radiol., 19:205, 1932.
5. Dukes, C. A.: Bull. Am. Col. Surg., (Dec.) 1931.
6. Dukes, C. A.: Surg., Gyn., Obst., 60:593, 1935.
7. Greenough, R. B.: Surg., Gyn., Obst., 51:561, 1930.
8. Martin, F. R.: Surg., Gyn., Obst., 60:452, 1935.
9. Morton, Jno. J.: Surg., Gyn., Obst., 52:531-532, 1931.
10. Mudd, Emery, Meland, and Costolow: Am. Jour. Roent. Radium Therapy, 31:520-531, 1934.
11. Pack, R. T.: Surg., Gyn., Obst., 58:248-254, 1934.
12. Rector, F. L.: Minn. Med., 16:330, 1933.
13. Sivertsen, I.: Minn. Med., 17:431, (July) 1934.

CARCINOMA OF THE STOMACH

Stanley R. Maxeiner, M.D., F.A.C.S.
Assistant Professor of Surgery,
University of Minnesota

A discussion of carcinoma of the stomach seems to be particularly timely in view of the perfectly hopeless outlook which has usually been presented to patients suffering from this malady. It might seem that at last we may assume a more hopeful and optimistic attitude toward palliation or even possibly toward a cure. Better results can only be accomplished through education of the patient to consult his physician at the very onset of symptoms and also to educate us as physicians to exercise every means at our command to diagnose cancer earlier.

Dean Lewis states that only 20 per cent of carcinomata involving the stomach which report at Johns Hopkins Hospital are resectable; and still, Dr. Warwick from Minneapolis showed that 23 per cent of necropsies on patients dying from cancer of the stomach had no metastases. Gatewood, in an analytical study, showed that his patients waited an average of 5.3 months after the onset of symptoms before seeing a doctor. After these patients consulted their physician another delay of 8.3 months occurred before the patients were submitted to operation. The second delay rested squarely upon the shoulders of the physician and was too often due to his hopeless attitude. It is impossible for me to paint a glowing picture of the end-results but I hope to present to you a brighter and more optimistic side to be obtained by surgery in suitable cases.

Carcinoma of the stomach involves the male at least twice as often as the female. Family history plays a part in only 16 per cent of cases. While th average age incidence is about 56 years, 25 per cent o the patients with this disease are under 50, Osler and McCrae reporting six patients under ten years of age One of our own cases with inoperable carcinoma wa only thirty-one and twenty patients were under forty five years of age.

While various reports throughout the large clinics show that only 50 per cent of stomach cancers are operable, a recent report by Balfour gives more encouraging figures. Fifty-eight per cent of all cases diagnosed carcinoma of the stomach were advised exploration and in 42 per cent of the explored cases removal of the growth was possible. There is no question but what these are the most promising statistics and because of the fact that these patients were explored at an earlier date, Balfour is able to repor 273 patients in whom resection of the stomach was performed who lived five years or more. Of these 128 have liver more than ten years. This must be taken as a hopeful sign if one considers the repor of Friedenwold in 1914 when only 3.3 per cent of 1,000 cases were resectable. Fifty per cent of the cases reported by Gatewood were pronounced inoperable and the majority were victims of procrastination Of the operated cases, 40 per cent of the patients who recovered from resection lived more than five years, two of his patients surviving sixteen and seventeen years each. Bloodgood, in 1915, stated that only 26 per cent of cases seen by them were operable. A review of the cases as they report for treatment shows that in general, 50 per cent of carcinoma cases are inoperable, 50 per cent subject to exploration and only 25 per cent are resectable. Finsterer, however, resects 65 per cent of his cases of gastric cancer. It is encouraging to note that 31 per cent of Finsterer's patients with simple resection and 30 per cent of patients surviving operation in which resection of the liver, pancreas or colon was necessary, lived from five to eighteen years without recurrence. Dr. Arnold Schwyzer reports one patient living twenty-four years after removal of cancer of the stomach without recurrence. Langdon Parsons states that without operation the average length of life in their series was but six months while in the cases resected, 38 per cent of those who survived had a chance to live more than five years and 56 per cent more than three years. Compare these statements with the fact that without resection, all die and that the average length of life is from 5 to 15 months after the diagnosis is once established.

Pathology.—Bloodgood states that carcinoma of the stomach starts as a local growth in the mucosa. At first of very small size, it develops until it involves the wall of the stomach which becomes thickened and it may occur at any point between the pylorus and the esophagus. In the early stages there is no change on the peritoneal surface. Under the microscope there are epithelial cells of distinct morphology, recognizable as cancer cells, the arrangement of these cells varying according to the picture of the various types of carcinoma. In the Mayo Clinic it is held that there is a ype of cancer in which the primary stage is chronic ulcer and in which there is a definite displacement of he cells of chronic inflammation by typical cancer cells. The lesion changes in type from the flat edged ulcer with crater to one with elevated edge and uneven border or niche which, with a crater wider than 2.5 centimeters, is usually malignant. In many of these ulcers it is impossible to tell by gross appearance whether they are or are not malignant, and the final diagnosis rests upon the microscopic examination. The chronic ulcer under the microscope shows the inflammation with the granulation base while the malignant ulcer shows the invading carcinomatous cells involving he edge of the ulcer or displacing the granulations n the base.

Much argument has arisen as to the percentage of cancers which develop on ulcer, MacCarthy contending hat as high as 70 per cent of their cancer cases develop upon ulcer. Moynihan believes that two-thirds of their cancer cases develop upon an ulcer base but Ewing places the figure at only 5 per cent. Bloodgood likewise believes that the percentage is small. It would seem that, in any event, the theory of chronic irritaion as an etiological factor may well play a part in he pathological change which takes place in the degeneration of a chronic ulcer into a carcinoma. The change from benign tumors to cancer of the stomach s probably a good deal more rare than formerly had been supposed.

Symptomatology—One must constantly bear in mind hat early cancer produces but few symptoms. A patient, especially a male, in the cancer age who complains that he is not perfectly well, is pepless, tires easily, cannot concentrate upon his work, sleeps poorly, and feels a general malaise, has lost some weight and is slightly anemic should be carefully regarded for possible beginning cancer. Moynihan speaks of it as he earliest departure from health of which he is aware. Maes says the use of the thermometer and the sputum bottle in the young should be supplemented by gastrointestinal x-ray examination in older individuals. Dyspepsia may not appear until a late date in primary cancer while it may predominate in the cancer developing on ulcer. That group of chronic dyspeptics who often have a protracted ulcer history who present a recent distinct change in complaints, a sudden exacerbation of symptoms, an absence of interval relief and a lack of response to any form of medical management, must be studied carefully for cancer developing on ulcer. Loss of appetite, epigastric pain, vomiting, loss of weight, tarry stools, marked anemia and a palpable abdominal mass are listed in medical text books as the symptoms of stomach cancer. They are diagnostic signs of advanced disease and if they are waited for we can never hope to improve the end-results of surgery.

Anemia is apt to be severe in any malignancy but is never a constant finding. Progressive loss of weight usually indicates advanced disease. A tinge of jaundice is suggestive. Chemical blood in the gastric content and stool is an important finding but may be even more frequent in benign gastric lesions. Hydrochloric acid may be absent but Hartman reports free hydrochloric acid in 50 per cent of cases studied at the Mayo Clinic. In fact, perfectly normal chemical findings are not incompatible with gastric cancer. Blood studies, gastric analyses and other clinical and laboratory data should always be available but cannot be considered pathognomonic until late in the disease.

X-ray examination of the stomach at the present time constitutes our greatest diagnostic asset but must be used in connection with history and other examination data. White and Leonard state that in no case that they reported as a normal stomach was cancer proved to exist, and Carman found that 95 per cent of gastric cancers gave roentgenologic evidence of their presence. In the hands of a thoroughly competent radiologist, early filling defects, lack of peristalsis or the appearance of a chronic ulcer may suggest early malignancy or gross obstruction, and gross defects may positively detect it. On the other hand, in those occasional doubtful cases, an inventory of all available data, clinical history, etc., must be considered by clinician and radiologist together before a definite diagnosis can be determined and a safe plan of treatment outlined. Re-ray after a short interval may be most important.

Treatment—Given a typical case with generally positive findings of carcinoma of the stomach one must determine whether or not exploratory operation is indicated. McVicar called attention to the most common sites of metastases as follows: rectal shelf, liver, supraclavicular lymph nodes, peritoneum (ascites), umbilicus and chest. No patient with carcinoma of the stomach should escape an examination of the rectum. Implants to the pelvis give rise to that firm, cartilaginous feel or a sense of firm resistance to the peritoneum, and occasionally the presence of hard nodules can be made out. The Krukenberg tumor, the result of implants in the pouch of Douglas, may be present, gross involvement of the liver may be detected on examination or by x-ray after the use of thorotrast. Liver involvement usually indicates inoperability although its involvement may not preclude palliative surgery. The presence of hard, supraclavicular nodes in the presence of a positive diagnosis of carcinoma means metastatic involvement. If in doubt one of these nodes should be removed for biopsy. Involvement of these nodes is due to spread through the lymphatics and, Balfour states, contraindicates any surgery as the span of life in such a patient is very short. Lymphatic involvement may be demonstrable in the region of the navel and is of grave import.

In the absence of gross evidence of metastasis, the surgeon must be governed somewhat in his course of treatment by the duration of symptoms, the size and amount of fixation of the tumor and the general physical state of the patient. Exploration should be performed whenever no absolute contraindication exists with the purpose of (1) cure and (2) palliation. Reported cases prove conclusively that clinically inoperable carcinoma may be benefited by resection of the primary mass and that even in the presence of ascites, Krukenberg tumors and metastatic involvement of lymph nodes and liver, pain is relieved, cachexia disappears, general sense of well being returns and the patient may live in comfort for two to three years to die a painless death from liver metastasis. One patient of our own in whom we did a partial gastrectomy in the presence of liver and lymph gland involvement, had a complete relief of symptoms for more than one year and became so well that his insurance company refused to continue his disability. Occasionally, instances occur when radical surgery is performed, and enlarged, inaccessible lymph glands are not removed but the patient remains well for ten years or more. This would indicate that the remaining glands were not malignant or that the disease ceased to progress after the operation. Stimulated by prospects of real palliation, partial gastrectomy should be performed whenever possible in preference to any other operation. Finsterer says, "Without resection every patient will die, and die in pain and misery. Therefore, I must resect whenever possible." In the presence of early or resectable cancer, one should always aim toward permanent cure. Balfour reports that when cancer was confined to the stomach, 53 per cent of patients lived three years but when adjacent lymph glands were involved, only 20 per cent lived three years. It is inevitable that the degree of malignancy of the lesion will determine to a large extent the end-results. Gray's figures indicate that of their patients who lived ten years, 61 per cent were graded Group 1 or 2 and 39 per cent were graded Group 3 and 4. In those cases of Grade 1, the prognosis was twice as favorable as those of Group 4.

Bloodgood says that the prevention of chronic ulcer is a prevention of carcinoma. Lahey teaches that within a period of three weeks of intensive medical treatment all symptoms of gastric ulcer must be completely relieved, that x-ray study must show definite improvement and finally healing, and that blood must disappear from stool and gastric contents or surgery is indicated. Moynihan warns that even gastric carcinoma may show a degree of clinical silence with rest and diet. When in doubt, exploratory operation must be employed and the lesion excised or partial gastrectomy performed. The diagnosis as to whether a lesion is benign and can be satisfactorily treated by excision or gastroenterostomy, or whether the lesion is malignant and will require gastric resection is one that must be made at the time of exploration and upon its accuracy must hang the life of the patient. According to Alvarez, an ulcer the size of a dime has a 1 to 15 chance that it is benign, the size of a quarter, 1 to 10. If the size of a fifty cent piece, 2 to 1 chance it is not benign, and if the size of a dollar, carcinoma is almost positive. The large ulcer with deep penetrating notch is usually benign, while the more shallow ulcer with elevated edge and a niche, 2.5 centimeters, is prone to be malignant. The microscope may be required to make the diagnosis certain. Recently in a case of obstructing ulcer of the pylorus we performed gastric resection for what appeared to be a benign ulcer both clinically, by x-ray and in gross specimen, but which the laboratory reported to be definitely malignant. Because of the possibility of malignancy being present, partial gastrectomy fortunately was done and not a gastroenterostomy. At almost the same time excision of a larger penetrating ulcer on the lesser curvature proved to be non-malignant. It is in this type of surgery where the lesion is so early that radical surgery may expect to produce its cures.

Operative mortality ranges from 5 to 51 per cent and usually simple exploration and gastroenterostomy carry the highest mortality as they are done on the poorest surgical risks. Gastroenterostomy is a very poor palliative operation because the poor musculature of a carcinomatous stomach means a poorly functioning stoma, the life of the patient is prolonged only a short time and pain often persists because the ulcerating tumor mass still remains. Exclusion, as recommended by Balfour, divides the stomach above an irremovable tumor, turns in the distal end and anastamoses the proximal end after Polya. This operation is scarcely more hazardous but diverts the current from the diseased portion and thus relieves pain and promotes an improved general health. Simple gastric resection is performed for carcinoma of the stomach with a mortality of approximately 10 per cent. It should always be the method of choice in early tumors as it is the only chance for permanent cure. On the other hand, it should always replace gastroenterostomy and exclusion even in the presence of irremovable metastasis when the primary mass is removable because as stated, removal of the tumor stops pain and cachexia and many patients survive 2 to 5 years, to die of painless liver metastasis.

One of our patients on whom we removed the entire stomach from pylorus to esophagus was so relieved. He regained his health completely so that he pursued his hobby of hunting ducks, deer and bear, and told me that he had enjoyed more real pleasures than he had ever had before in his life. He stated that that one year of comfortable activity and the relief from intolerable pre-operative pain well repaid him for the discomfort of a surgical operation. Several instances are reported in which resection performed as a palliative procedure had produced entirely unexpected five year cures. The very radical, complicated resection of Finsterer in which the liver, pancreas or colon are also resected carries a mortality of 41 per cent but is justified by the fact that 30 per cent of survivals live five to eighteen years.

Safety of operation is enhanced by careful preoperative preparation consisting of a sterile diet for at least three days, repeated gastric lavage and replacement of fluids and blood. Many postoperative deaths are due to peritonitis in carcinoma patients, the result of an infected stomach content. In ulcer, the stomach content is virtually sterilized by the hydrochloric acid which has been accepted as an indication for its administration and irrigation with .25 per cent solution for several days preoperatively.

The writer has observed more than 60 cases of cancer of the stomach in the past twelve years. The oungest was thirty-one and the oldest, seventy-eight. n a series of 50 cases, seventeen, or 36 per cent, were onsidered inoperable, seven were explored only; there vere seven gastroenterostomies and eighteen gastric reections. Among eighteen gastric resections there were hree deaths or approximately 16 per cent. There were wo total gastrectomies with one death. One resecion with a preoperative diagnosis of carcinoma proved o be syphilis and the patient is well. In only two of he patients who had resection could the lesion be alled early. It has been quite impossible to obtain a ollow up record but some of these patients are known o be alive and well although they are all recent or nder three years.

Conclusions

1. Improved results from gastric surgery performed or carcinoma of the stomach must depend upon earier diagnosis and earlier operation. This can only be ecured by education of the patient to consult his phyician at the first onset of symptoms, and the early liagnosis of carcinoma by the attending physician.
2. The x-ray at the present time is our greatest aid n diagnosis.
3. Chronic gastric ulcer which does not respond to nedical management demands surgery.
4. The end-results of surgery in gastric cancer are ot brilliant but it is infinitely better for a patient with astric resection to live a few years in comfort than to o on to a rapid painful death.
5. Surgery should always be directed toward a pernanent cure but in the absence of this possibility, paliative surgery produces many very gratifying results. astrectomy should at all times be the choice in prefrence to gastro-enterostomy or exclusion.

ELECTROCOAGULATION OF CARCINOMA OF THE RECTUM AND SIGMOID

James A. Johnson, M.D., F.A.C.S.

Carcinoma of the rectum and sigmoid comprises bout 4 per cent of all carcinomas of the body, and 0 per cent of all carcinomas of the large bowel are ocated in this area. Its very location makes it a paricularly hazardous disease. Although a great deal has een done during the past decade to improve the morality and to bring about better results in the treatment f this condition, there is still much to be desired.

As in other parts of the body, the great majority of hese cases occur during the cancer age, and most frequently during the fifth and sixth decades. It is not t all unusual, however, to have the condition develop n the thirties, and I have seen a fatal case at the age f nineteen.

The etiology of carcinoma of the colon is no more learly understood than is that of carcinoma of other arts of the body. However, since such a large perentage of carcinomas of the colon occur in the rectum and lower sigmoid, it is quite probable that constant irritation is a factor in its development. This is also a frequent location of adenomas, polyps and diverticulitis, and it is a proven fact that many of these undergo malignant changes. It is quite probable, therefore, that carcinoma often develops as a result of preexisting lesions, and this in a measure may account for its frequency in this locality.

With the exception of epitheliomata (squamous cell carcinoma) which occur only when the growth arises from the perianal skin, all carcinomata of the rectum and sigmoid are adenocarcinomata and vary in their appearance only because of their cellular structure and method of growth. Clinically, there are four types of carcinomas in this locality:

1. The raised or polypoid growth which tends to block the lumen and often gives rise to early bleeding. As a rule they produce early symptoms and are less malignant.
2. The ulcerating, crater-like growth with a nodular margin. These penetrate deep into the surrounding structures, often are late in producing symptoms, and relatively early in invading the lymphatics.
3. The annular constricting growth which contains a large amount of fibrous tissue, and causes early constriction of the bowel. Occasionally acute intestinal obstruction is the first serious symptom.
4. The soft gelatinous or colloid growth, either single or multiple. These are usually rapidly growing and highly malignant.

The symptoms vary with the location and type of growth. When located in the right half of the colon constipation, anemia and weight loss are usually the predominating symptoms, while those in the sigmoid and rectum often produce early diarrhea, together with frequent stools of mucus and blood. Any patient who has previously been regular, then becomes constipated, has diarrhea, loss of weight, and anemia, or passes mucus or blood in the stool should be carefully examined by proctoscopy and x-ray for the possibility of existing carcinoma.

Carcinoma in the rectum or sigmoid in any case is a serious condition, and carries with it grave consequences. The operative mortality is high in individuals in good health. When it occurs in the aged or in persons who have other serious lesions, we must of necessity consider the added risk. One can truthfully say that a carcinoma in this locality in an aged individual is not only a sad condition, but a very formidable lesion. It is often made all the more serious in many cases because of the presence of other lesions, such as coronary disease, myocardial degeneration and marked anemia with weight loss, which renders the patient absolutely unfit for any major operation. Often these old people are cared for by their relatives and do not, with a colostomy, become a welcome member of the household. To take the risk of a radical operation, together with subjecting them to a permanent colostomy, is certainly not very desirable.

It was when I was confronted with such a case on September 12, 1927, that I first employed electrocoagulation with destruction of the growth *in situ.* The satisfactory result obtained in this case has led me to its application in eight cases. I do not intend to have this procedure replace the classical radical operations in cases that are considered good surgical risks. It is advocated here only for the cases of carcinoma of the rectum and lower sigmoid that would otherwise be considered inoperable or serious operative risks because of age or other lesions that would make radical operative procedure inadvisable. In these cases electrocoagulation offers the best solution. The mortality is very low, and the results compare favorably with radical operation.

If the growth is located in the extraperitoneal portion and has not penetrated into other vital structures, it can be completely destroyed. If it is in the intraperitoneal portion, especially if it is the infiltrating type almost completely involving the entire circumference of the bowel, there is always considerable doubt as to its complete eradication.

Electrocoagulation has been confined largely to the eradication of external growths. It has also been employed for some time to destroy malignancy in the urinary bladder. There are very few instances, however, where it has been utilized in rectal malignancy.

The cauterization is done with the coagulating current from a diathermy machine. Before beginning the operation, the cautery is always tested on a piece of raw steak. This is important in order to properly gauge its penetration. The operator should be thoroughly familiar with proctoscopy, and have the proper instruments at hand. I use a large operating proctoscope for lesions in the rectum. When the lesion is located high, in the intraperitoneal portion of the bowel, it is necessary to use a smaller scope, and the visualization is not as good as with the large scope.

The patient is placed on the operating table on the abdomen with the head lowered. Gas or local anesthesia may be used. When gas is used, it is always supplemented by infiltration of local anesthesia about the rectum. The proctoscope is introduced, and a careful examination is made in order to get a comprehensive estimate of the extent and location of the lesion. The growth is then systematically destroyed by coagulation *in situ*. The technic is often difficult and exacting. This is especially true when the lesion is located above the rectal shelf in the intraperitoneal portion. Great care must be exercised in this portion of the bowel to avoid penetrating its wall, with a resulting peritonitis. Smoke accumulates during the coagulation, but this can easily be removed with a suction apparatus. The operation must not progress too rapidly because of the intense heat that develops.

There is usually very little postoperative discomfort. The patient is kept on a liquid diet during the first two days, and after that a low residue diet, mostly semi-solid. On the third day he is given moderate doses of liquid petrolatum morning and night, and there is usually very little discomfort at stool. The confinement to bed depends on the location and severity of the condition. Most patients may get up and be about within a week.

I have not been confronted with any serious complications. There has been no postoperative bleeding. If this should occur it can best be controlled by the cautery.

Patients should be carefully examined two months after the operation for evidence of any remaining growth, and if any is present it is again carefully coagulated.

I have now operated upon eight patients using this method. Three had a second operation because of incomplete removal, and three had to be re-operated as a result of recurrence. This resulted in a total of fourteen operations. There has been no operative mortality.

The following are reports of cases treated by electrocoagulation:

Case 1.—Mrs. W., aged eighty-four, came for examination on September 12, 1927, complaining that during the past six months she had been passing blood and mucus in her stools and had lost about five pounds in weight. On proctoscopic examination a large ulcerating, infiltrating carcinoma about 8 cm. above the anal sphincter, involving approximately one-half the circumference of the bowel, was found. General examination showed a marked vascular sclerosis, blood pressure 220 systolic, 120 diastolic, frequent extrasystoles and a loud systolic murmur at the apex. She was obviously not in condition for radical operation. Her mental capacity was excellent.

On September 17, 1927, the entire growth was destroyed by electrocoagulation. Microscopic examination showed adenocarcinoma. She survived the operation without any difficulty. There was smooth healing of the bowel where the growth had been removed, and almost no narrowing of the lumen. On repeated examinations there has been no sign or symptom of recurrence. She is mentally alert and takes an active interest in life at the age of 92. It is now seven years and six months since her operation.

Case 2.—Miss G., aged seventy-nine, was first examined November 22, 1928. She complained that during the past ten months she had been passing blood and mucus in her stools. Previous history revealed that the right breast had been removed eleven years ago, probably for a non-malignant condition. Seven years ago she had fractured her right hip and was able to get about only by the aid of a cane. Proctoscopic examination revealed a large, infiltrating and ulcerating carcinoma on the right anterior wall of the rectum, involving the valve and extending down onto the internal hemorrhoidal area. On general examination there was marked arteriosclerosis and a deep-seated adenomatous goiter.

November 24, 1928, the entire growth was destroyed by electrocoagulation. Microscopic examination showed adenocarcinoma. She had an uneventful recovery and since she lived out of the city did not return for re-examination until February 9, 1929. At this time there was an extensive recurrence of the growth. This was completely destroyed by electrocoagulation. A recent examination revealed no sign or symptoms of recurrence and the stools are normal. She is now 85 years of age, and it is six years and four months since her original operation.

Case 3.—Mrs. S., aged sixty-two, reported for examination November 10, 1931, complaining of indefinite rectal distress with occasional diarrhea. Proctoscopic examination revealed a growth about one and one-half inches in diameter, of the raised type, located just behind the second valve on the right side. She had been a semi-invalid for several years because of an old pulmonary tuberculosis. A year previous to her examination she had fractured her left hip. She was not considered a good risk for radical operation.

On November 14, 1931, the growth was destroyed by lectrocoagulation. Microscopic examination showed denocarcinoma, Grade 2. She has had frequent ex- minations since that time and there has been no re- urrence to date. It is now three years and five months ince her operation.

Case 4.—Mr. C., aged sixty-eight, was first exam- ned March 26, 1932. He stated that during the past ix months he had noticed blood in the stool, with di- rrhea and cramp-like pains. At the time he reported or examination he had had complete obstruction for en days and there was a great deal of bleeding. He vas a very weak, frail individual, almost entirely deaf. Hemoglobin 60, R.B.C. 3,580,000. The urine was neg- tive. He had to be supported on the table by two in- lividuals during the proctoscopic examination, which evealed a large proliferating carcinoma at the rectal helf and in the first part of the sigmoid. His abdo- nen was distended and he was suffering from obstruc- ion.

On March 28, 1932, the growth was completely de- troyed by electrocoagulation. Microscopic examination howed adenocarcinoma, Grade 3. His recovery was neventful, he had normal stools and began to regain is former strength. On April 15, 1932, he was re- xamined and there remained a small amount of pe- lunculated carcinomatous tissue in the lower sigmoid. This was destroyed by electrocoagulation.

He was again re-examined on June 25, 1932; there vas complete healing and no evidence of any growth. He regained his former strength and weight, was able o get about as usual, and had normal stools until March 4, 1933, when he reported again and we found xtensive recurrence at the site of the old lesion. The rowth was again completely destroyed by electroco- gulation. On April 17, 1933, examination revealed no vidence of growth. On June 2, 1933, he reported again vith a large recurrence. He was advised to have a co- ostomy, which he refused, as he had done on previous ccasions. However, on July 4, 1933, he became com- letely obstructed and a colostomy was done at his ome, which he scarcely survived, and constantly rew weaker and died February 9, 1934, one year and leven months after his first operation. This is an ex- mple of a very malignant, rapidly growing carcinoma, nd it is quite probable that he would have had a rompt recurrence following any type of radical opera- ion.

Case 5.—Mrs. V., aged seventy-two, was first exam- ned August 17, 1932. She complained of bloody dis- harge from the rectum during the past eight months, vith a great deal of diarrhea and pain in the lower bdomen. She had lost ten pounds in weight and for he past week had not had a stool. Proctoscopic ex- mination revealed a large obstructing annular carci- noma at the recto-sigmoidal junction.

On September 7, 1932, the growth was thoroughly lestroyed by electrocoagulation and the microscopic xamination revealed adenocarcinoma. She was re- xamined on November 2, 1932, at which time there vas a small recurrence, or remaining portion which iad not previously been destroyed, and which was gain coagulated. After this she improved considerably, vas up and about, had normal stools and gained in veight, until September 2, 1933, when she was seized vith a very severe pain in the abdomen. She soon be- ame distended, apparently had a perforation of the owel resulting in a general peritonitis. She died three lays later, one year after the first operation. We were nable to obtain a post mortem.

Case 6.—Mrs. E., aged seventy-eight, was admitted o the hospital February 14, 1933, because of severe ecurrent rectal hemorrhages for several months. She vas a very frail old lady, was almost completely deaf nd was extremely emaciated. She had to be support- d during the proctoscopic examination, which revealed several masses of soft gelatinous carcinoma extending from just above the rectal sphincter into the lower sigmoid, at which point the bowel was almost completely closed. The area about the valves was literally filled with this soft gelatinous growth. She developed a bronchopneumonia and nothing could be done at that time.

On March 16, 1933, about a month after her admission, under local anesthesia, all the masses were completely coagulated. Microscopic examination showed adenocarcinoma, Grade 4. She was in stupor for a considerable time, had Cheyne-Stokes respiration, pulse was imperceptible, blood pressure 54 systolic, 30 diastolic. She recovered, got out of bed, and regained her strength. On April 5, 1933, she was re-examined and a large mass was found on the first valve. This was thoroughly coagulated. She rapidly regained her health and was discharged from the hospital on May 6, 1933. She had a good appetite and had normal stools until March 20, 1934, when she was readmitted for examination. At this time there was a recurrence just beyond the rectal shelf. This was thoroughly coagulated and she was discharged April 2, 1934. She remained in good health until September 2, 1934, when she was re-admitted with intestinal obstruction. There was extensive recurrence in the bowel, almost completely blocking its lumen, and the liver was enlarged and filled with nodules. There were large carcinomatous masses in the right supra-clavicular area, the left upper jaw, and multiple nodules in the scalp. She died September 14, 1934, one year and six months after the original operation.

Case 7.—Mrs. D., aged eighty-four, was first examined November 11, 1933. She gave a history that she had had constipation and bleeding from the rectum for the past three months. Proctoscopic examination revealed a proliferating carcinoma in the lower sigmoid. The growth was very soft and there was extensive bleeding on sponging. She was a very frail old lady, weighing about 80 pounds, had a systolic murmur at the apex, hemoglobin of 68, and on general examination she was not considered a suitable risk for radical operation.

On January 5, 1934, the growth was completely destroyed by electrocoagulation. Microscopic examination showed an adenocarcinoma, Grade 4. Since that time she has been up and about, there has been no weight loss and she has had regular stools. About a month ago she noticed a little bleeding. On March 28, 1935, proctoscopic examination revealed that there is a moderate recurrence at the site of the old tumor, which will again have to be coagulated.

Case 8.—Mrs. J., seventy-three years of age, was admitted March 19, 1934, because of severe hemorrhage from the bowel. She stated that she had had some bleeding on occasions during the past two years and had lost 28 pounds in weight. Proctoscopic examination revealed a soft elevated carcinoma at the rectal shelf extending up into the sigmoid. She was much emaciated, had a hemoglobin of 50, and electrocardiogram revealed definite myocardial degeneration. She complained frequently of anginal attacks, lasting over two hours.

On March 21, 1934, the growth was thoroughly destroyed by electrocoagulation. She had an uneventful postoperative course and was discharged from the hospital April 1, 1934. Microscopic examination revealed adenocarcinoma, Grade 3.

On July 31, 1934, she was again examined and there was some recurrence, or a remaining portion of carcinoma found. This was again destroyed by electrocoagulation. She has not been examined since that time but in a communication from her during the past week she states that she is having considerable abdominal cramps. It is probable that she has either a constriction or a recurrence.

Conclusions

1. Electrocoagulation is not intended to replace radical operation in patients who are considered surgical risks.

2. A carcinoma located in the extraperitoneal portion of the rectum, that has not penetrated into surrounding structures, can be completely destroyed by electrocoagulation.

3. If the growth is located in the intraperitoneal area, and is extensive, electrocoagulation can only be considered a palliative treatment.

4. Electrocoagulation is particularly suitable in the aged individual, who is inoperable, and whose life expectancy is short. It is our duty to give them as much comfort as possible during that short period.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

DISEASES OF THE MOUTH AND THEIR TREATMENT. By Herman Prinz, A.M., D.D.S., M.D., D.Sc., D.M.D., Professor of Materia Medica and Therapeutics, The Thomas W. Evans Museum and Dental Institute, School of Dentistry, University of Pennsylvania; and Sigmund S. Greenbaum, B.S., M.D., Associate Professor of Dermatology and Syphilology in the Graduate School of Medicine of the University of Pennsylvania; Attending Dermatologist, Mt. Sinai and Philadelphia General Hospitals. Published by Lea & Febiger, Philadelphia. Price $9.00.

Diseases of the Mouth and Their Treatment presents an ideal combination of authors on the subject of the medico-dental problems met in general practice. Dr. Prinz needs no introduction to the dental profession, having written extensively on materia medica and therapeutics and being the author of a book on that subject. Dr. Greenbaum's wide teaching and clinical experience in dermatology and pathologic problems complete this combination.

The publication gives a complete presentation of oral disease including those of local origin and manifestations of systemic disturbances. The authors present an enormous mass of material on the subject of mouth disease covering all forms and describe many unusual and rare cases. Etiology, symptomatology, bacteriology, diagnosis, prognosis and treatment are all considered. Profuse illustrations add to the value and interest for the reader. The book is of particular interest for consultation and reference.

The chapters on oral manifestations of metabolic derangement and avitaminosis are indeed timely, with the increasing evidence of the association of nutritional unbalance and oral disease. The discussion on tumors and cysts contains only macroscopic illustrations. The omission of microscopic plates is due, no doubt, to the fact that the book is intended as a consultant for practitioners rather than as a pathological text. A valuable introduction to the book is a review of anatomy and physiology of the oral cavity.

In collaboration with the authors many well known writers have added much of value in several chapters. The book is thoroughly up-to-date and complete in its treatment of the subject.

Carl T. Grove, D.D.S.

DOCTORS AND JURIES. Humphreys Springstun of the Detroit Bar. 155 pages. $2.00. Philadelphia: P. Blakiston's Son & Co., Inc., 1935.

The first five chapters are mostly devoted to defining the various terms of law in regard to medical practice. Under the chapter of Warrantees there is special reference given in regard to the liability of the physician when he makes specific promises to the patient as to the results of his treatments.

It would be well for all physicians to read the various chapters on how to conduct oneself in court. There are several good thoughts listed which should be carefully studied.

The last few chapters are devoted to insanity in regard to degree, crime, contracts, and wills, and under the chapter on Proof of Insanity, one is surprised to read that the law does not recognize expert testimony upon the subject as being of any greater value than that of ordinary persons although the jury probably would take the physician's testimony as being of greater value than the ordinary layman's.

The book is concise and easily read, and, to anyone frequently called into court, it is well worth reading.

Edward C. Gibbs, M.D.

TEXTBOOK OF SURGERY. W. Wayne Babcock, M.D., F.A.C.P. 2d ed. rev. 1312 pages. Illus. Price $10.00. Philadelphia: W. B. Saunders Company, 1935.

This text of surgery is a well compounded résumé of all the common surgical diseases and most of the unusual surgical conditions which one could encounter in a lifetime. It deals briefly with the symptoms, signs, diagnosis and treatment of these diseases. Its pages are beautifully illustrated and helpful anatomic, pathologic and diagrammatic drawings which make it helpful to better advantage than thousands of descriptive words have done. It does not aim to present a treatise on any phase of surgery but serves well in pointing out the fundamental details which are so essential for those who would desire to refresh their memories on its numerous subjects.

To have written this book must have entailed numerous long hours of conscientious labor, but to have planned it and to have experienced a practice representing its contents seems almost beyond the abilities of human endeavor.

Carl O. Rice, M.D.

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society.

Volume 18 AUGUST, 1935 Number 8

HISTORICAL NOTES ON THE MINNESOTA VALLEY MEDICAL ASSOCIATION AND THE SOUTHERN MINNESOTA MEDICAL ASSOCIATION*

MONTE C. PIPER, M.D.

Rochester, Minnesota

In coming to Mankato to attend a meeting of the Southern Minnesota Medical Association, there is a certain satisfaction as of a family reunion at the ancestral home, for, while the Southern Minnesota Medical Association was organized at Winona and the Minnesota Valley Medical Association was organized at Le Sueur, each has designated Mankato as the selected city for its annual meeting at some time during its history. Also the greatest number of meetings of this Association has been held in Mankato, this of 1934 being the sixteenth. Hence, it would be voicing the sentiments of all members to say that we are happy to return home again. Hospitality of the Blue Earth County Medical Society has always been graciously extended, and many traditions, of which the association may be proud, have been established here.

The thanks of the association are hereby extended to the Blue Earth County Medical Society, to the members of your committees who have given their efforts to make this meeting so worthwhile, to the officers and citizens of your city who have coöperated, to the members of the staff of the *Mankato Free Press,* who have always extended a helping hand, and to the members of your Ladies' Auxiliary who have made the program of entertainment for our families so enjoyable.

To view in retrospect with you some of the traditions which have gone into building up the personality of the Southern Minnesota Medical Association, the medical records of these component societies have been investigated.

More than half a century ago, after the country was convalescing from the scourge of that terrible malady, the Civil War, there were physicians in this youthful state of Minnesota who must have been strong individualists. Methods of practice had caused each to become self-reliant, and induced each to exert his influence to help the community as well as to practice his profession. Yet these individualists realized that there were others in their neighborhoods who had similar problems, and were of similar personality and characteristics, and when these neighbors had opportunity for exchanging ideas, they found that they could be a help to each other. Organized medicine had been set up previously in the American Medical Association, the state medical societies and the county medical societies, but the county societies were limited by political boundaries.

These individualists desired a common meeting place where they could give and receive the benefits of association with one another. Probably after several conferences among certain leaders of those days and exchanges of letters, the idea of a medical association for mutual benefit was conceived. It is said that the physicians of Mankato first presented the idea. Railroads were the chief means of travel between cities, and the "Omaha Road" was the chief "arterial" of the Minnesota River Valley.

In October, 1880, Dr. Otis Ayer, of Le Sueur, wrote to some physicians of his choice asking them to convene at Le Sueur on December 1. At this convention the names recorded were those of Dr. Otis Ayer and Dr. George D. Swayne, of Le Sueur; Dr. C. F. Warner, Dr. Z. G. Harrington and Dr. E. J. Davis, of Mankato; Dr. C. F. Merritt, of St. Peter; and Dr. Alfred Mueller, of New Ulm. Possibly there were others, but the record is lacking. Here they organized the Minnesota Valley Medical Association on December 1, 1880, and adapted the by-laws of the Ramsey County Medical Society as a foundation for their government. The roster of charter members includes Dr. Otis Ayer, Le Sueur; Dr. C. K. Bartlett, Minneapolis; Dr. D. B. Collins, St. Peter; Dr. R. O. Craig, Janesville; Dr. E. J. Davis, Mankato; Dr. A. W. Daniels, St. Peter; Dr. Z. G. Harrington, Mankato; Dr. James J. Henry, Mankato; Dr. G. F. Merritt, St. Peter; Dr. G. R. Maloney, Belle Plaine; Dr. George D. Swayne, Le Sueur (Wahpeton, N. D.); Dr. Charles J. Spratt, Minneapolis; and Dr. C. F. Warner, Mankato. By 1883 the roster contained forty-five names, the mention of many of which would recall to your memory pioneers of our communities. Dr. H. M. Workman of Tracy was a member in 1881, and surely would have been a charter member had he lived on the Omaha Road at that time.

---

*From the Division of Medicine, The Mayo Clinic, Rochester, Minnesota. Read before the Southern Minnesota Medical Association, Mankato, August 13, 1934.

Dr. Otis Ayer was honored with being chosen the first president. A photograph of Dr. Ayer has not been obtained, but a brief résumé of his biography is convincing evidence of his individuality. Dr. Ayer was born in New Hampton, N. H., in 1817; he read medicine with Dr. John A. Dana of his native city and graduated from Dartmouth in 1841 and from Jefferson Medical College in 1842; he practiced medicine in New Hampton for eleven years, and came to Le Sueur in 1856; but returned to his home and came back to Le Sueur in 1857 to remain. It is said that Dr. W. W. Mayo preceded him in settling in Le Sueur by a few months, but Dr. Mayo had moved to Rochester before the organization of the Minnesota Valley Medical Association. Dr. Ayer was surgeon to the Second Minnesota Regiment of Volunteers and was taken prisoner but was soon released. He was president of the Minnesota State Medical Association in 1877. He died in 1889.

Dr. C. F. Warner, of Mankato (photograph), was first vice-president, one of Mankato's strong characters and a lovable physician. He came to Mankato in 1869, had served in the Civil War as assistant surgeon to the 136th New York Volunteers and later as surgeon to the 58th New York National Guards. He died in Mankato in 1910. Dr. A. W. Daniels, of St. Peter (photograph), was second vice-president. Asa Wilder Daniels was truly a pioneer of this state; he was born in Stratford, N. H., in 1829, and attended the Boston School of Medicine. He arrived by river boat at St. Paul, July 4, 1853. He was soon appointed United States Government Surgeon at the Lower Sioux Agency between Fort Ridgely and Redwood Falls, and was a close friend of Little Crow. In 1854 he used chloroform anesthesia to amputate the arm of La Frombois, a grandson of Chief Sleepy Eye. This is the first recorded use of chloroform northwest of the Mississippi River. In 1862 he joined the Volunteers who went to the relief of New Ulm when it was besieged by the hostile Sioux. He was lost for three days in a blizzard in 1873. He contributed chapters to Folwell's "History of Minnesota." He died in 1923 at the age of ninety-four years.

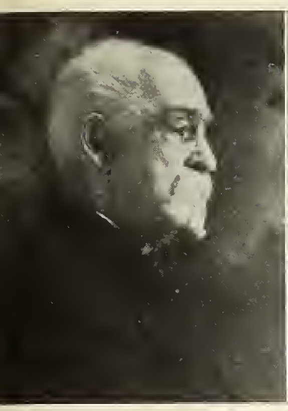
Dr. Alfred P. Mueller, of New Ulm (photograph), was third vice-president. Dr. Mueller came from Berne, Switzerland, where he was born in 1825. He came to Stillwater in 1856, and to Fort Ridgely during the Indian outbreak, where he remained and directed the hospital. Many thrilling records of his services to the wounded and ill are recorded. His wife, Eliza Mueller, is revered for her heroic work as a nurse to the unfortunates of that day. Her works were commemorated by the state legislature in 1877, which authorized a tablet on her grave to be inscribed, "The State of Minnesota to the Memory of Eliza Mueller." Dr. Mueller returned to Switzerland, where he died in 1896.

Dr. C. F. Merritt, of St. Peter (photograph), was Treasurer of this association during its thirty-one years of existence, and also when it became amalgamated with the new Southern Minnesota Medical Association, until his death in 1921. He was born in Danville, N. Y., in 1846.

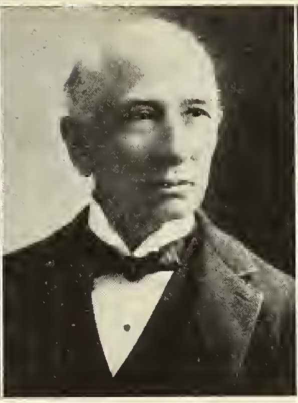
Dr. George D. Swayne, of Le Sueur, was the first secretary. No further record of Dr. Swayne is at hand.

The foregoing were the officers. It would have been of interest to have shown a photograph and to have given a short biography of each of the earliest members; the reading of the roster of names, however, must suffice. All were individualists.

Drs. C. K. Bartlett, J. H. James and D. B.

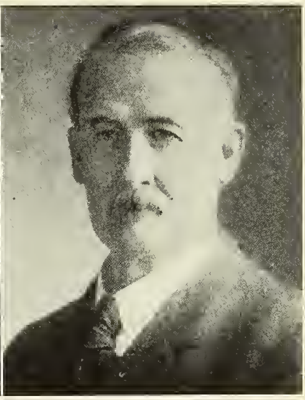


Dr. C. F. Warner



Dr. A. W. Daniels

Dr. A. P. Mueller



Dr. C. F. Merritt

ollins were from St. Peter. Drs. J. W. An-rews, William Frisbee, William Jacoby, W. R. cMahon, Z. G. Harrington, C. F. Warner and J. Davis were from Mankato. Others were s follows:

Dr. Charles Berry, New Ulm; Dr. Ira Bishop, apleton; Dr. R. Parkin, Minnesota Lake; Dr. . T. Case, Waterville; Dr. Straw, Wells; Dr. . H. McMichael, Vernon Center; Dr. Garrett urphy, Garden City; Dr. R. McGuire, Blue arth City; Drs. H. H. Herring, and W. R. Cullen, Lake Crystal; Dr. M. Mickelson, Delavan; rs. C. O. Cooley and Joe McMahon, Madelia; r. C. R. Bacon, St. James; Dr. Green, Winlom; Dr. J. F. Force, Heron Lake; Drs. C. O. oore, R. B. Barber and Craft, Worthington; r. E. B. Haynes, Winnebago Agency; Dr. . L. Remington, Alma City; Drs. R. O. Craig nd McDonald, Janesville; Drs. M. V. Hunt, . S. Cummings and Young, Waseca; Dr. A. J. edge, Albert Lea; Dr. W. Dodge, Henderson; r. T. W. Hammond, Montgomery; Dr. Maoney, Belle Plaine; Drs. E. P. Hartley and ewis, Carver; and Drs. J. H. Dunn and Lord, hakopee.

There are many others in the later roster, any of whom leave pictures in one's mind, surounded almost by a halo of reverential memory.

The presidents of the Minnesota Valley Medial Association held office in the following order: Dr. Otis Ayer, Dr. C. K. Bartlett, Dr. . F. Warner, Dr. D. S. Cummings, Dr. Z. G. Harrington, Dr. H. M. Workman, Dr. Charles Berry, Dr. C. O. Cooley, Dr. E. J. Davis, Dr. D. B. Collins and Dr. W. H. Rowe.

The Minnesota Valley Medical Association was the first district medical organization in the state, although others soon followed. Dues were fifty cents and originally it was decided that no banquets were to be held. Money was said to be scarce in those days, and finances were not to act as a barrier to desirable members. The meetings were conducted somewhat after the manner of Methodist Class Meetings; that is, members would report cases which had occurred in their practice since the last meeting, the cases being discussed by other members. This society existed for thirty-one years.

Much of the foregoing record has been obtained from an historical article published by Dr. E. J. Davis, of the Soldiers' Home, in the *St. Paul Medical Journal.* The secretarial records are not at hand and probably are lost. It is hoped, however, that they may be found and placed in the records.

* * *

The second chapter of the history has to deal with the formation of the original Southern Minnesota Medical Association. There had been for some years an agitation to form an association similar to the Minnesota Valley Medical Association among the physicians of Rochester, Winona, Owatonna and the communities along the Winona and St. Peter Railroad. Consequently, in 1892, letters were sent out by Rochester doctors calling a meeting at Winona for July 28. The need for such an organization was appreciated, thirty-five physicians attended, and the association was founded on that day.

The Committee on Permanent Organization consisted of Drs. W. T. Adams, of Elgin, W. J. Mayo, of Rochester, and J. B. McGaughey, of Winona. The name Southern Minnesota Medical Association was adopted, and the rules and regulations of the American Medical Association were selected in so far as they were adaptable to the requirements. All members of county medical units were eligible, and the proposed territory was the southern tier of counties. The function of the society was to be entirely nonpolitical; all such political matters as might come up were to be settled by the various county societies. Dues were 50 cents. Dr. Franklin Staples, of Winona, was the first president (photograph). Dr. Horace H. Witherstine, of Rochester (photograph), was the first secretary-treasurer, and he held the office until 1898. It is of interest to note the rather cryptic notation in the records of the treasurer after the entries of receipts and disbursements, "short $7.50."

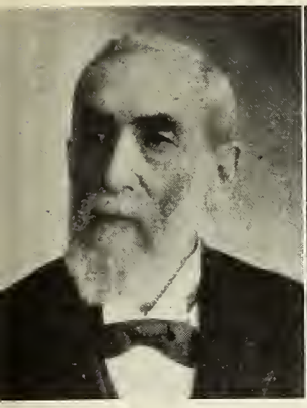
The first paper was by Dr. McGaughey (photograph), on "Cerebrospinal Meningitis"; the second paper was by Dr. W. J. Mayo on "Less Common Forms of Surgical Tuberculosis." Meetings were held annually in Winona, Rochester, or Owatonna, in churches, hotels, courthouses, or hospitals. Once the members met in the Episcopal parsonage at Winona. The second meeting was conducted in the Rochester State Hospital, with the members of the association as guests of the superintendent of the hospital, Dr. A. F. Kilbourne, who was also the second president of the association, and who has ever continued to be one of its enthusiastic members. At this second meeting, Drs. W. A. Jones, of Minneapolis, and Thomas McDavitt, of St. Paul, participated in the program.

The association seemed to fill a definite need, for it grew and made for itself a place in the medical life of southeastern Minnesota. The programs were varied, and it is of interest today to review these old records for they portray the trend of medical thought on many topics which have a bearing on our present-day medical problems. Most of the participants in the programs were members, and outside, or guest, speakers were comparatively few until later years. Much of the time was apparently given over to free discussion of the topics. As many as seven or eight physicians frequently took part in a single discussion. For example, in 1895, the topic "The Pathology of the Vermiform Appendix" aroused "general participation on the discussion of this paper and all sides of the pathology were presented." Again, the symposium on different forms of rheumatism included "Its Pathology," by Dr. A. W. Stinchfield, "Its Symptoms and Diagnosis," by Dr. T. N. Van Cleve, and "Its Treatment," by Dr. A. S. Adams. Does not this remind us of some of the symposiums presented today? "Leucocythemia" was a topic discussed by Dr. W. J. Mayo, in 1898, while Dr. C. H. Mayo presented "Mastoid Disease," which was discussed by Dr. F. C. Todd. In 1899, Dr. J. B. Murphy, an honored guest, opened the discussion of Dr. Charles Mayo's paper, "Some Varieties of Aneurysms," and later presented a paper on "Diagnosis of Abdominal Lesions." "Prophylaxis of Tuberculosis" was presented by Dr. E. E. Bigelow, of Owatonna, and was discussed by Drs. W. J. Mayo, A. F. Kilbourne, Tomlinson, J. B. McGaughey, J. W. Andrews, R. C. Dugan, J. B. Murphy, Chambers, and N. S. Tefft. "The discussion became heated and earnest." Contrast such a program with our didactic type of meetings today.

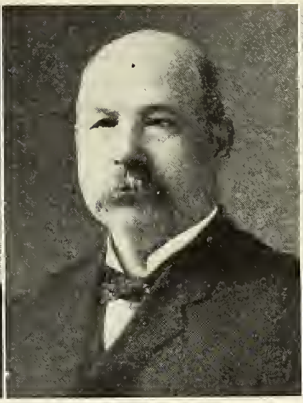
Any record of this association would be very incomplete if it did not pay tribute to the secretary from 1898 until 1916, Dr. W. T. Adams, of Elgin (photograph). Dr. Adams must have had a keen insight into human nature. The faithful recording of transactions and the résumés of discussions, largely in longhand, add very much to the value of these old records. They reflect well the spirit of the members and of their successful meetings. For example, in 1900, to quote from the minutes: "Dr. Byron Robinson, of Chicago, who was booked for 'Vaginal Histerectomy,' gave us a talk on the subject in lieu of his paper. The doctor's remarks elicited the most careful attention and received a most thorough discussion, largely from members from the Twin Cities." Dr. Alexander Stone, of St. Paul, opened the discussion, followed by Dr. J. E. Moore, of Minneapolis, and Dr. C. H. Mayo, of Rochester. Again, "Dr. Taylor, of St. Paul, asked to have a resolution passed upon here with reference to the Establishment of a Sanitarium for Tuberculosis by the State."

In the business session of 1901:

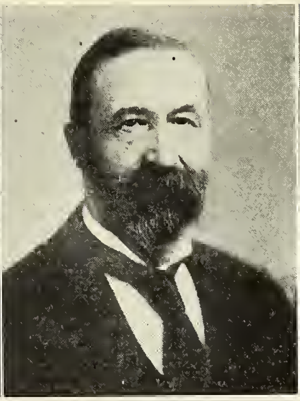
> "Dr. Andrews moved the President say to the W.C.T.U. that we are in sympathy with them. Discussion followed and Dr. Andrews withdrew his motion." "Dr. J. B. McGaughey in his courteous and genteel manner extended an invitation in behalf of the Winona



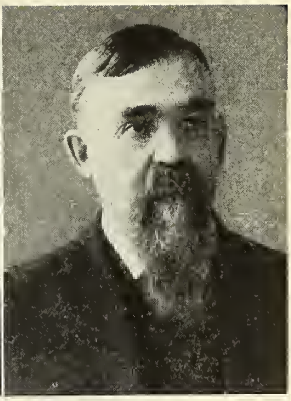
Dr. Franklin Staples



Dr. H. H. Witherstine



Dr. J. B. McGaughey



Dr. W. T. Adams

County Medical Society for this Association to meet n August, 1903, in the city of Winona. The doctor's remarks were very convincing and the Association unanimously voted to accept the invitation."

Again:

"'Pneumonia,' Dr. T. L. Hatch, of Owatonna. Discussion opened by Dr. C. L. Green of St. Paul. Dr. Hatch's paper was well received and showed a very careful study of the subject both in the literature and from the standpoint of practical experience. Dr. Green spoke at length and emphasized the idea that the mortality of pneumonia is greatly influenced by influenza. Dr. Tomlinson entered into a lively discussion on points pathological. He believes a better understanding of the pathology of each case is essential. Dr. H. M. Bracken made a comparison between prognosis of pneumonia and typhoid fever. He thought much depended upon individual characteristics, spoke of controlling temperature with baths, etc., as of prime importance. Dr. C. H. Mayo requested Dr. Hill to give his experience. Dr. Hill said in forty-five years practice in Minnesota he has venesected and given calomel and jalap. He would practice venesections in the plethoric, in the anemic—no. Dr. Hill criticized Dr. Hatch for the great multiplicity of remedies suggested, said, 'We did bleed heroically, perhaps we went too far, but the young man of today may have too many remedies.' The paper was further discussed by Dr. Stinchfield, Dr. Andrews, Dr. Spiere, Dr. Chambers, Dr. Bayley and closed by Dr. Hatch.

"To summarize—The prognosis depends upon the condition of the patient—on the amount of lung and portion of the lung involved, the character of the heart. Some would use digitalis, others discard it, and strychnine was generally mentioned with favor. Bathing to control temperature was spoken of with favor and the method of isolating the patient was generally favored."

At this meeting (1903) Dr. W. J. Mayo's paper called attention to "the fact that there is a tendency for malignancy to follow the irritations caused by the presence of gallstones."

In 1904:

"'Heredity' by Dr. R. M. Phelps of the Rochester State Hospital, whose theme seemed to be that 'nature tends to a perfect state,' and Dr. W. J. Mayo, in discussion, referred to tuberculosis; he thinks, 'people who become more recently infected succumb more readily to tuberculosis than those who are inured to the influence of infection, cited the Negro and Indian as examples.' He thinks, 'degenerative diseases, such as cancer, may be hereditary, while infectious diseases, such as tuberculosis, are not.'"

At this meeting Dr. J. G. Cross discussed paratyphoid and Dr. Phelps the Widal reaction. In 1906 at Winona:

"Reverend Edward Borncamp pronounced the benediction. Before doing so, he read a portion from the Bible which had to do with medicine, which seemed to strike the larger number of the members as a profound surprise, for I doubt if very many present even knew that the medical profession was the subject of special mention in the Sacred Writ."

Throughout Dr. Adams' service as secretary the records are full of interesting comments. The resolution adopted after the death of Dr. Adams reads:

"It is not requisite to the fullest development of sterling character that a man shall pass his years in the turmoil of cities nor vex his soul with further strivings for the high places of the earth. Rather, amid the quiet and solitude of the countryside alone in the daily battle of life, are ofttimes brought to the highest perfection those qualities of self reliance, calm judgment, wise discretion and unfailing courage for overcoming of what difficulties beset the path of him who deals continuously with the weighty matters of life and death.

"And so we record our appreciation of Dr. Adams as one who measured full to the standard of excellence in all relations, and bring our tribute of respect and esteem to the memory of an honorable and upright man."

The records of Dr. Adams as secretary reveal how the early members were willing to step forward and each contribute what he could of experience and knowledge. These individualists, many of whose names are those of the leaders of our profession, all have been coupled with the formative days of our country and with the policies of our medical association; they have helped to build the personality of the Southern Minnesota Medical Association, if you like.

* * *

We come then to the third chapter of our history, the amalgamation of the two associations. The territories and the functions overlapped, and many men were members of both associations. A committee of the Minnesota Valley Medical Association petitioned the Southern Minnesota Medical Association in 1910, stating in effect that the two societies would best serve the larger interest if they consolidated, and asking to carry on as the Southern Minnesota Medical Association. Consequently, a joint meeting was held at Rochester, in 1911, in the forenoon at St. Mary's Hospital and in the afternoon at the Rochester State Hospital, where the business meeting was held and the consolidation effected. The transactions are all fully and carefully recorded in the minutes. The Minnesota Valley Medical Association had existed for thirty-one years and contributed 105 members, while the Southern Minnesota Medical Association was nineteen years old and contributed 115 members. Dr. H. F. McGaughey was temporary president and Dr. A. G. Liedloff temporary secretary. The late Dr. L. A. Fritsche, of New Ulm, was the newly elected president of the amalgamated societies, while Dr. J. E. Crewe and Dr. H. F. McGaughey were vice presidents; Dr. C. F. Merritt was treasurer until his death in 1921, and Dr. W. T. Adams was secretary until he died in 1916.

A significant record made at this meeting in 1911 was of a memoir to Dr. W. W. Mayo, read by his old friend, Dr. Charles Hill. Another significant incident was the reporting, by Dr. Walter E. Sistrunk, of the prevalence of amebiasis in people of this northern climate.

Dr. L. A. Fritsche, of New Ulm, was the first president of the present society, and although he was prevented from presiding at the next meeting by the severe illness of Mrs. Fritsche, he must have known his material when he appointed the new chairman of the program committee. The society took on renewed energy and growth, and that increased impetus was not permitted to falter, perhaps largely due to the efforts of the chairman of the program committee, Dr. Aaron F. Schmidt, of Mankato (photograph). Dr. Schmidt served in this capacity for a number of years and was later designated as secretary-general. It was during this time that the association made its greatest growth and achieved its greatest successes. The programs were elaborate, and, in 1914, the guest speakers included Dr. Bertram W. Sippy, Dr. Dean Lewis, Dr. Allen B. Kanavel, Dr. Oliver S. Ormsby, Dr. H. M. McClanahan, Dr. James S. Goetz, and Dr. Arthur D. Dunn. In 1922 the following imposing names were on the program: Dr. William B. Coley, New York; Dr. George E. Shambaugh, Chicago; Dr. Willis E. Campbell, Memphis; Dr. George J. Heuer, Cincinnati; Dr. Walter B. Cannon, Boston; Dr. Judson Deland, Philadelphia; Dr. Fred H. Albee, New York; Dr. M. G. Seelig, St. Louis; Dr. Herman L. Kretschmer, Chicago; Dr. Preston B. Hickey, Detroit; Dr. Nathaniel G. Alcock, Iowa City; and Dr. George V. J. Brown, Milwaukee. In 1914 at Winona, and in 1915 at Red Wing, the afternoon sessions were held on board Dr. Mayo's boat, the "Orinoco," but in June, 1918, the association was prevented from holding its meeting on the boat, because of government restrictive measures on the use of coal during the World War.

Dr. Aaron F. Schmidt

During the war many of the members were in service, and their dues were honored by the society; therefore, it became necessary to double e assessment on those who were at home. In 917 the following resolution was adopted:

> “Resolved that we, the members of the Southern Innesota Medical Association, as an expression of our yalty to our country in the present national crisis, ereby agree to do everything in our power as citizens d physicians, to aid our country in its great struggle r right.”

Efforts to expand the influence of the asso- ation were successful, and there came a time hen it became a threatening rival of some of e larger medical organizations. There was talk f further expansion, but it was seen that such xpansion would result, again, in duplication of ffort. The Tri-State Medical Association was unctioning and the Minnesota State Medical ssociation was expanding its influence. Some f the wiser heads of our association felt that might be going beyond the limits of its intents nd purposes and counselled that it be what its ame implied, The Southern Minnesota Medical ssociation. In 1919, at Mankato, Dr. W. J. Iayo remarked as follows:

> “Dr. Andrews has said that the association is equal o, if not greater than, the state association. I want to ay to you, members of the Southern Minnesota Medi- al Association, that this should not be true; that very man who is here is potentially a member of the tate medical association, and he should attend the eetings of the state medical association as the repre- entative body of the state. After all, we are a local ociety, but we have very great traditions.”

Traditions we still have as precedents. At the rst meeting after the amalgamation, in Man- ato, there occurred an incident relative to one f those individualists who was greatly respected. t was recorded as follows:

> “In 1912, at the opening of the afternoon session, ome one expressed a regret that Dr. Z. G. Harrington vas not present and it was explained that the doctor elt somewhat aggrieved that the old Minnesota Valley Iedical Association was dissolved, and, to express to Dr. Harrington the true feeling of the newly organized Southern Minnesota Medical organization, a committee vas sent to bring Dr. Harrington to the hall and in- roduce him to the Association. The doctor came with is escort and, at an urgent request, made a few well- hosen remarks that showed the great heart of the peaker, that while the dissolution of the old society vas a sore grievance to him, he did not want to stand n the way of that which is believed by his friends to e for the betterment of the profession. A few minutes vere taken for members to shake hands with the enerable physician.”

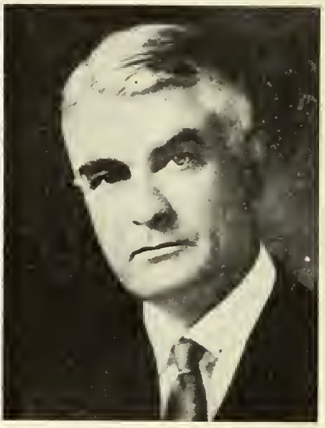
In the past twelve years, which might be said to be the subject of the fourth chapter of this record, the effort on the part of your officers has been to be of as great service as possible to the members. Programs have never lacked in excellent material, and those who have attended the annual meetings have felt that the days have been well spent. In 1929 the afternoon program was presented on board the Strekfus Excursion Steamer, the “Capitol,” carrying 368 members and guests. In 1917 and again in 1933 the association was invited to conduct a meeting in Minneapolis as guests of the Hennepin County Medical Society, and in 1919 it was invited to Clear Lake, Iowa, but the Executive Committees have always found it more expedient to convene in the home communities.

Dr. Z. G. Harrington

About 1921 there was a deficit in the treasury and members had to “dig down” to make it up. In 1920 business houses of Mankato contributed $605 for expenses of the association. In 1926, there was $920 in the treasury, and last year our cash resources were slightly more than $4,000.00. Since 1892 the Association has met in Mankato sixteen times, in Rochester twelve times, in Winona eleven times, in Owatonna seven times, in Faribault three times, and once each in Albert Lea, Austin, Fairmont, Red Wing, and New Ulm. There have been twenty-one two-day programs, the last one of which was held in Rochester in 1928. In 1929 the association adopted the suggestion of Dr. Waltman Walters that a suitable medal be offered to that senior medical student at the University of Minnesota who should be selected by a committee of the faculty. The selection of the student was to be based on his proficiency in the fields of medicine and surgery during his senior years. Also, it was decided to award another medal for excellence of a scientific exhibit at the annual meeting of the Minnesota State Medical Association. These have been awarded annually. For three years there has also been issued a second award of $100 to a senior medical student of the University of Minnesota. This student has been selected by the same committee of the faculty which makes selection of the recipient of the medal. A medal also has been presented to that participant in our own programs whose offering in the judgment of the president's committee has the greatest merit.

Dr. J. W. Andrews

Dr. C. H. Mayo


Dr. W. J. Mayo

This year an award is added for the best case report presented by some member of the association. It is to be hoped that these awards may stimulate greater effort.

In mentioning the names of those who have contributed so largely to the success of the society there are, first, the presidents: Dr. Franklin Staples, Dr. H. T. McGaughey, Dr. Charles Hill, Dr. N. S. Tefft, Dr. S. W. Ransom, Dr. H. H. Witherstine, Dr. J. H. Adair, Dr. E. D. Keyes, Dr. A. S. Adams, Dr. J. P. Waste, Dr. Christopher Graham, Dr. A. B. Stewart, Dr. R. C. Dugan, Dr. A. L. Baker, Dr. C. O. Cooley, Dr. O. F. Way and Dr. T. L. Hatch. At the time of amalgamation of the two associations, in 1911, of these, Drs. Kilbourne, Graham, Stewart, and Way were living.*

Subsequent presidents have been Dr. L. A. Fritsche, Dr. J. H. James, Dr. A. B. Stewart Dr. H. F. McGaughey, Dr. F. A. Dodge, Dr E. S. Judd, Dr. A. F. Schmidt, Dr. M. S. Henderson, Dr. John Williams, Dr. H. Z. Giffin, Dr W. J. McCarthy, Dr. W. F. Braasch, Dr. F. P. Strathern, Dr. H. W. Meyerding, Dr. F. R. Huxley, Dr. H. T. McGuiggan, Dr. J. S. Holbrook, Dr. E. H. McLaughlin, Dr. Waltman Walters, Dr. J. T. Schlesselman, Dr. Charles C. Allen, Dr. R. V. Williams.

The roster contains about a thousand names.

There have been only six secretaries: Dr. H. H. Witherstine, Dr. W. T. Adams, Dr. H. Z. Giffin, Dr. H. T. McGuiggan, myself and Dr. Habein.

Traditions of the past may influence the trend of the future. Although this association was originated for the interchange of professional experiences and ideas among its members, the requirements of today perhaps suggest the gathering for round-table discussion more than classroom instruction. An effort has been made today to foster discussion and to encourage participation in the symposiums on symptoms in the morning sessions. Further use of this type of program may be made in the future if it meets with favor. Because of ease of modern travel, it might be desirable to have two or three afternoon meetings, permitting members to return home at night, attend to their patients in the morning, and reconvene in the next afternoon for the program. The last afternoon might be devoted to lectures by distinguished guests and a grand rally at the evening banquet.

Your officers and committees welcome helpful iticism and suggestions. The members of this ssociation have always been ready and willing lend helpful suggestions or to give timely arnings. There come to memory the names of any who have been of most valuable assistance, rough the years of the association's existence. he interest of such men, behind such an organiation, speaks surely for its large influence on e medical profession. Such names as the folowing seem closely associated with the Southern innesota Medical Association: A. M. Mcaughlin, E. S. Judd, W. J. Cochrane, F. A. odge, W. P. Freligh, J. W. Andrews (photograph), J. S. Holbrook, D. F. Hallenbeck, A. M. Snell, A. B. Stewart, H. T. McGuiggan, H. W. Meyerding, Harold Habein, F. R. Huxley, W. H. Valentine, Waltman Walters and P. F. Holm.

---

*Drs. Graham, Stewart and Way are still living. Dr. Kilbourne has died since this article was read.

And, of course, there have always been before us the names of two men who have cherished our progress as we have learned to cherish their wisdom, who have never held office, who have always willingly contributed to the programs and responded with valuable aid and advice when requested, who have perhaps furnished our highest inspirations, Dr. William J. and Dr. Charles H. Mayo.

INFLUENCE OF GASTRIC LAVAGE ON FAMILIAL AND NON-FAMILIAL ERYTHREMIA*

JOHN FRANCIS BRIGGS, M.D.
Assistant in Medicine, University of Minnesota
and
HARRY OERTING, M.D.
Assistant Professor of Medicine, University of Minnesota
St. Paul

A GREAT deal of evidence has accumulated in the past few years to indicate that the tomach is capable of secreting a hematopoietic ubstance. The manner in which this material s formed or the method by which it acts upon he blood-forming organs is still a matter of controversy. It must suffice that we accept the experimental evidence as demonstrated, and await urther work in determining the rôle of gastric hysiology in hematopoiesis. It is interesting, owever, to speculate as to the relationship that ay exist between gastric disturbances and the evelopment of blood dyscrasias.

In general the evidence to date suggesting the bility of the gastric mucosa to form a hematooietic material is based upon the studies of astric physiology in pernicious anemia and the evelopment, clinically, of an addisonoid anemia n gastrectomized individuals.

The absence of free hydrochloric acid in the astric juice of patients suffering from pernicious anemia has long been known,[10] as has been he fact that in pernicious anemia the stomach is ot capable of secreting free hydrochloric acid.[1] Further observation has shown that the achlorhydria may exist for many years before the appearance of those hematological characteristics peculiar to pernicious anemia.[18] The achlorhydria found in carcinoma of the stomach is not only associated with blood changes simulating pernicious anemia, but also with changes that are definitely characteristic of pernicious anemia.[2] As a result of the abnormal gastric findings in pernicious anemia, many observers suggested that these changes in gastric physiology may be of etiological significance in pernicious anemia.[4,9] In contrast to the observations that an achlorhydria always exists in patients suffering from pernicious anemia, are those observations revealing the development of an addisonoid anemia where disease or operative procedures have altered gastric physiology. Pernicious anemia has been found associated with gastric polyposis[20] and it is suggested that in this instance the polyposis was the cause of the pernicious anemia. The influence of gastrectomy upon hematopoiesis is widely recognized. Hartman,[8] Moynihan,[17] Dennig,[5] and Hurst[9] have reported the development of an addisonoid anemia in individuals subjected to total gastrectomy, and recently Goldhamer[7] has reported an additional case of this type of anemia, as well as reviewing those cases already reported. It is worthy of note that the addisonoid anemia following total gastrectomy reacts in exactly the same manner to liver therapy as does the true case of pernicious anemia.[4,7]

---

*Read before the Central Society of Clinical Research, No-ember 4, 1934.

Castle[3] by a series of brilliant experiments was able to prove that the gastric mucosa did play a definite part in the formation of a substance capable of hematopoiesis. He also demonstrated that this particular function is absent in those patients suffering from pernicious anemia. He concluded that an intrinsic factor is secreted by the normal gastric mucosa which combines with an extrinsic factor in the food to form a hematopoietic substance.

Morris[13] believes that the hematopoietic substance present in the gastric juice in normal individuals is a hormone, and he has been able to isolate this particular substance from the normal gastric juice, and has suggested that it be named Addisin. He also believes that in pernicious anemia this hormone is absent, and that pernicious anemia represents a state of anaddisinism.[15] The intramuscular injection of the substance addisin has proven efficient in bringing about remissions in pernicious anemia.[12,13,14,15,16] Ederle has shown that an extract of hog gastric mucosa when injected daily is also effective in the treatment of pernicious anemia.[6] Morris has suggested a hypothesis that inasmuch as polycythemia vera has many features of antagonism to pernicious anemia, that polycythemia vera may well be a condition in which the hormone addisin is present to excess.[11,15] The erythremic type of polycythemia vera, in contrast to the erythrocyte form, which is a compensatory phenomenon, does show, during its course, alterations in the blood picture, indicating a stimulation of the blood forming organs. Heretofore this spontaneous increase in blood formation was considered to be of idiopathic origin. It seems possible, however, that these changes that occur in the blood picture of erythremia represent the influence of a hormone acting upon the blood forming organs. Following the suggestion of Morris that erythremia might be the result of hyperaddisinism, it was thought that gastric lavage might remove the hormone addisin in sufficient amount to relieve the erythremia. Such an observation was made by Tuchfield[21] in a patient with a duodenal ulcer and erythremia. He noted that frequent lavage of the stomach to relieve the ulcer pain also alleviated the erythremic symptoms. We felt that should this hypothesis be correct, then the feeding of expressed gastric juice of the erythremia should be effective in bringing about remissions in pernicious anemia. We also felt that this should result without the incubation of juice with beef or the use of those various means of preparing the juice as has been done heretofore. In order to eliminate the possibility of the erythremic juice interacting with purine bodies in the diet, thus forming a hematopoietic substance, the erythremic patient was placed on a low purine diet. The patient was then subjected to routine gastric lavage four to six times daily, with the time of the lavage being varied from day to day in a further attempt to eliminate the dietary factor in hematopoiesis. Under these conditions, the following observations were made in an individual suffering from erythremia.

Mrs. V., white, housewife, forty-two years of age, was admitted to the medical service at the Ancker Hospital in July, 1933. At the time of admission she complained of attacks of weakness and blurring vision. Since April, 1933, she had been suffering from recurring attacks of weakness and dizziness. Associated with these attacks were headaches of severe nature. These headaches were generalized and would occur at any time during the day. There was, however, no relationship between the headaches and events during her daily life. At times her eyes would blur, and she would have a transitory diplopia. She had accidentally discovered a mass in the upper left quadrant of her abdomen a few months before her admission to the hospital. The past history was of no importance to the present condition, and no members of her family suffered from polycythemia. There was no evidence that her present condition had any association with past events or occupations in her life. Only those physical findings relative to her present condition will be reported.

On physical examination the patient presented a striking appearance of a cyanosis. Examination of the eye grounds revealed a moderate choking of both discs. Cardiovascular examination revealed a systolic apical murmur with a mild degree of cardiac hypertrophy. Her blood pressure was 200 millimeters of mercury, systolic, and 140 millimeters of mercury, diastolic. There was no evidence of cardiac decompensation. The tumor mass, recognized by herself, was an enlarged spleen. The patient was disorientated and confused. She was bedridden and unable to be of any assistance to herself. Nothing on physical examination could be found to suggest that the condition might be an erythrocytosis, rather than an erythremia. Laborary examination showed the urine to contain varying mounts of albumin from day to day; urine examination was otherwise normal. Examination of the spinal uid showed nothing of note, and the blood Wassermann test gave negative findings. The basal metabolic ate was plus seven. Blood chemistry studies were ithin normal range. The sedimentation rate, bleeding, nd clotting time, as well as the icterus index, were ithin normal range. Fragility tests were normal. Under gastric lavage, blood examinations were as follows:

TABLE I

Date	Hb.	R.B.C.	W.B.C.	Retic.	
7-21-33	115	6.6	10,150	4 %	Lavage
8- 6-33	94	5.5	11,750		Lavage stopped
8-22-33	98	6.4	12,150	1 %	
8-23-33	105	6.24	17,500	3 %	Lavage started
9- 1-33	94	5.8		1 %	
0- 2-33	98	6.25			
0- 3-33	99	5.9			
0- 6-33	98	5.62			Lavage stopped
0-17-33	108	6			
0-23-33	98	4.98		1 %	
0-27-33	100	6.11		2 %	Lavage started
0-29-33	93	6.1		1 %	
0-31-33	98	5.5			
1- 2-33	98	5.8			
1- 8-33	92	5.7			
1-11-33	90	5.6			
1-12-33	92	5.7			
1-13-33	88	5.1			
1-15-33	55	5.25			
1-19-33	90	5.26			
1-23-33	90	5.26			
1-24-33	94	6.8			Stop lavage
1-27-33	100	6.9		1 %	
1-30-33	108	7.5	21,550		Lavage started
2- 1-33	108	8.3		4 %	Juice obtained
2- 2-33	100	7.9	19,000		
2- 3-33	90	7.0	16,100		Lavage stopped
2- 4-33	117	7.7	20,800		
2- 5-33	115	7.75	21,250	1.1%	
2- 7-33	123	7.86	15,500		
2-11-33	122	8.85	18,250		
2-13-33	129	10	23,500	1 %	Phenylhydrazine
2-15-33	117	7.3	17,400	1 %	
2-21-33	70	4.05	23,000	4.6%	Liver given
2-23-33	58	3.4		12 %	
2-26-33	46	2.4	25,250	17.6%	
2-27-33	43	3.2		12 %	
2-28-33	40	2.4		10.9%	
2-29-33	44	2.64			
2-30-33	48	2.1		7.6%	
1- 2-34	56	3.2	10,650	12.3%	
1- 9-34	60	3.55	9,800	8.9%	Liver stopped
1-11-34	61	3.32		6 %	
1-14-34	64	3.8	10,800	5.2%	
1-18-34	67	3.8			
1-24-34	62	3.7		3.3%	
1-28-34	105	8.8		1 %	

The patient at the time of admission suffered a good deal from mental confusion. Shortly following admission the patient was subjected to gastric lavage, as noted in Table I. Under this type of treatment, her cyanosis and mental symptoms disappeared, and the patient was able to be up and around in the ward, and of sufficient health to aid in the ward duties. All dizzy spells and headaches ceased with the gastric expression, and the blood picture dropped to lower limits. As soon, however, as lavage was discontinued, the patient became worse. The cyanosis returned, as did the dizziness and headaches, and the blood picture returned to higher values. The blood pressure readings changed with her periods of induced remission, but to such a moderate degree that they do not warrant recording. At will, we were able to alter the patient's condition by gastric lavage, until December 3, 1933, when lavage was stopped. Histamin and alcohol failed to stimulate the gastric mucosa, and the patient developed an exacerbation of her erythremia when lavage was stopped. The symptoms returned, and she was again confined to bed. On December 13, 1933, phenylhydrazin was given and was carried over into toxic doses. The blood picture returned to subnormal range, and 2 cubic centimeters of liver extract was administered intramuscularly each day. The blood picture improved rapidly with reticulocyte counts reaching 17.6 per cent. After liver therapy was stopped in January, 1934, the patient still continued to regenerate blood cells. The speed of the regeneration simulated the reaction of pernicious anemia to liver treatment.

The expressed gastric juice, as it was obtained from the erythremic patient, was normal to chemical analysis and this gastric juice was used to treat two patients suffering from pernicious anemia. The expressed juice was used as it was obtained from the polycythemic stomach. It was not concentrated, and no preservatives were added. The stomach contents were given to the pernicious anemia patients through a duodenal tube, and the average daily amount administered was two hundred and fifty centimeters, of which fifty centimeters was actually gastric juice, and the rest normal saline used in the irrigation. These two patients who received the gastric juice were on regular diets and no other therapy was given to them. Results of this experiment were as follows:

Mr. N., aged seventy-five, a retired white man, was admitted to our service at the Ancker Hospital on July 30, 1933. Mr. N. complained of weakness, vomiting, diarrhea and edema of the ankles. Four years before, he noticed a beginning edema of both ankles. He consulted a physician who gave him medicine which resulted in a temporary recovery from his symptoms. He felt well for one year, when his symptoms returned, and a second physician told him he was suffering from a carcinoma of the stomach. Without treatment, his symptoms disappeared. During the following three years his story is one of alternating well being and ill health. About one week before admission, his symptoms recurred, and he was referred to the hospital. Examination revealed a well developed, fairly well nourished white male of peculiar lemon color. Temperature, pulse, respiration, and blood pressure were all normal. His skin was definitely of lemon tint, and his tongue was smooth. In addition a tumor mass was palpated in the epigastrium, which was superficial in position, and was apparently a desmoid. There was loss of vibratory sensation over both ankles. Laboratory examination revealed a hemoglobin of 58 per cent, red blood count 2,800,000, and white blood count 3,250. Differential count revealed a relative lymphocytosis as well as those changes characteristic of pernicious anemia. The Wassermann findings were negative, and the icterus index was twenty-five. Analysis of the gastric juice showed no evidence of free hydrochloric acid on repeated examination. Urine examination was normal. Basal metabolism was plus five. Complete x-ray examination revealed no evidence of gastric malignancy. This patient received 250 centimeters of the erythremic gastric juice daily, with the following response in the blood picture.

Date	HB	R.B.C.	W.B.C.	Retic.
7-31-33	58	2.8	3,250	
8-11-33	60	2.0	7,500	4%
8-15-33	70	2.6	4,800	2%
8-20-33	62	2.7	7.200	
8-25-33	64	2.9	7,000	
8-31-33	68	3.4	7,000	5.5% Stopped
9-23-33	69	3.7	5,900	

This patient, suffering from pernicious anemia, made an excellent response to the ingestion of gastric juice. There was no other therapy given to the patient during this experiment. The treatment was continued from August 2, 1933, to August 31, 1933. The original complaints, that brought him to the hospital, had disappeared, and he was able to return to the out-patient department for routine care.

On November 14, 1933, Mrs. M., aged sixty, was admitted to our service because of diarrhea and abdominal pain of twelve days' duration. She gave a long history of many illnesses, unrelated to the present disease, the outstanding story being one of repeated treatments for a chronic edema of the left leg. It was developed later that this edema followed a phlebitis that occurred in her youth. Twelve days before admission, the patient noticed abdominal pain of cramp-like nature, that was followed by diarrhea. This had been so severe that she was finally hospitalized. Physical examination revealed a well developed, well nourished white female, who was not acutely ill. Her skin was deep yellow in color, and her tongue was typical of pernicious anemia. The rest of the examination was negative, except for a chronic edema of the left leg. Pulse, temperature, respiration and blood pressure were within normal limits. Laboratory examination revealed a hemoglobin of 36 per cent, red blood count of 1,600,000, and white blood count was 4,500. Cellular morphology was typical of pernicious anemia. The Wassermann findings, urine examination, and blood culture, were normal. Icterus index was 19. Stool examinations were normal, and examination of the gastric juice revealed the absence of free hydrochloric acid. On November 19, 1933, she was given 250 centimeters daily of the erythremic juice with th following response in the course of her disease.

Date	Hb.	R.B.C.	W.B.C.	Retic.	
11-19-33	38	1.6	4,550	0	
11-22-33	40	2.0	3,150		
11-23-33	50	2.0	4,100	0	
11-26-33	48	1.9	5,850	6%	
11-29-33	44	1.9	5,050		
11-30-33	54	2.1	4,700		
12- 3-33	64	2.2			Out of juice Liver given 2 c.c. intra-muscular
12- 5-33				1.2%	
12- 7-33	52	2.2	5,100	6.7%	Patient developed uppe respiratory infection
12-11-33	55	2.2	5,950		
12-12-33	55	2.4	6,400	3.4%	
12-15-33	52	2.1	9,650	2.8%	
1-14-34	67	3.2	12,000		

The general appearance of the patient improved upon ingestion of the gastric material. Her appearance became better, and the patient felt relieved of the symptoms that caused her admission to the hospital. On December 3 our supply of gastric juice was depleted and 2 centimeters of intramuscular liver was given daily in place of the juice. The patient's progress was hindered for a time because of the development of an upper respiratory infection, but under liver treatment she continued to improve.

It was apparent that in this particular case of erythremia, gastric lavage seemingly removed some substance capable of stimulating blood formation. It was difficult, however, to believe that this mechanism was present in those individuals suffering from the familial type of erythremia.

Spodaro[19] has recently given an excellent review on the subject of familial polycythemia vera and brings the total number of cases of this disease down to date. It has been felt by us that in this particular type of erythremia the blood change is not the result of an excess hematopoiesis, but rather represents a failure of the organisms to destroy red blood cells. Thus familial erythremia would represent the antagonistic syndrome to familial jaundice. This supposition is purely hypothetical and lacks proof at the present writing.

Through the courtesy of the Wilder Dispensary, Mr. Q. was referred to us to study the effect of gastric lavage upon erythremia. After admission it was found that many members of his family were suffering from the same disease, and blood studies made upon relatives now living reveal that many of them are suffering from erythremia. Mr. Q. was a white man, forty-seven years of age, who was admitted to our service on January 26, 1934. He complained of headaches and dizziness which had been present for many years. He was apparently well until one year ago, when people began to remark about the increasing ruddiness of his complexion. Dizziness and ocular disturbances became worse at the same time, and occasional throbbing headaches would disturb his vision. Because of the increase of these symptoms, he was sent to the Wilder Dispensary, where it was discovered that he was suffering from polycythemia vera. He was placed on phenylhydrazin therapy with fair success until the past few months, when he found he was unable to tolerate the drug any longer. His past history, occupation, and habits were in no way connected with the present illness.

Family history: His father died of a stroke at the age of sixty-two. His mother is now living and well. He stated that practically all members of his family—by this he meant his brothers and sisters—had the same type of ruddy complexion as he had himself.

Laboratory examination: Urine was normal to routine examination. Blood Wassermann examination, icteric index and blood chemistry were normal. X-ray examination showed no evidence of any existing disease. At the time of admission his hemoglobin was 137 per cent, red blood count 8,280,000 and 7,000 white cells. Under gastric lavage the white blood count, red blood count, and the hemoglobin varied from that at the time of his admission, to the highest two weeks after admission with a hemoglobin of 152 per cent, 9,270,000 red blood cells, and 7,250 white blood cells. The reticulocyte count never exceeded 1.2 per cent at any time. At one time there was a spontaneous decrease in the blood picture, during which time the hemoglobin fell from 150 to 134 per cent, and the red blood count from 9,250,000 cells to 7,800,000. Fragility test at the time of admission revealed hemolysis beginning at 0.36 and complete at 0.28. At the time the drop in blood picture occurred spontaneously, hemolysis began at 0.48 and was complete at 0.32 as compared to normal hemolysis beginning at 0.48 and complete at 0.32. The icterus index at this time became elevated to twenty degrees. Bleeding and clotting time, as well as sedimentation rates, were normal. The basal metabolism rate was normal; and gastric expression was normal. The patient had no marked decrease in his blood picture as a result of a gastric lavage, except that when gastric lavage was stopped, and he was no longer obtaining any therapy to decrease the red blood count, his hemoglobin rose to 160 per cent, his red blood count to 10,200,000 and his white cell count to 9,500. One brother was found to have a hemoglobin of 105 per cent with 5,840,000 red blood cells and 7,200 white cells. Another brother was found to have a hemoglobin of 130 per cent and a red blood count of 5,520,000, and a white count of 6,250. A third brother had a hemoglobin of 113 per cent, red blood count was 5,900,450, and 6,750 white blood count. The fourth brother was found to have a hemoglobin of 126 per cent, red blood count 5,730,000 and a white count of 10,400. The fifth brother was found to have a hemoglobin of 105 per cent, red blood count of 5,840,000, and a white count of 9,200. Two sisters, who are living out of town, have been investigated and found also to be suffering from erythremia. We were unable, however, to obtain the value of the hemoglobin and red blood counts in these instances. The ages of his brothers vary from thirty-six to forty-five years of age.

Gastric lavage apparently had no effect upon lowering this man's blood picture, except that when it was stopped the value of the various constituents of the blood reached higher limits. While undergoing lavage, the patient always felt better and had little trouble with dizziness and his usual subjective complaints. An interesting observation was made in that the reticulocyte counts were never excessive, and that spontaneous decrease in the red blood cells and the hemoglobin was followed by an elevated icterus index. In addition the white blood cells of the patient and his family were always normal, suggesting a lack of white blood cell stimulation.

Observation suggested that during the time of the elevation of the red blood cells and of the hemoglobin, some alteration in the fragility of these cells had occurred, and that hemolysis was unable to occur. It suggested to us that with the persistence of a stable reticulocyte count there was no great influence brought to bear upon the blood forming organs by a hormone, but rather that the increase in the blood constituents was the result of his inability to destroy red blood cells, and that the difficulty was one of increased cell resistance rather than of increased blood formation.

Conclusions

1. Evidence has been presented to indicate that the stomach is capable of secreting a substance that has hematopoietic power.

2. Lavage of the stomach in a case of erythremia resulted in an improvement of the clinical symptoms with a decrease of the individual cell constituents of the blood.

3. The administration of the untreated erythremic gastric juice to two patients with pernicious anemia, brought about clinical and hematological remission in their diseases.

4. One case of familial polycythemia is reported in which lavage failed to lower the constituents of the blood, but prevented these constituents from increasing to higher levels.

5. It is suggested that erythremia is the result of an excessive formation of the hormone addisin, and represents a condition of hyperaddisinism, and that pernicious anemia represents the antagonist of this disease, in which there is an absence of this gastric hormone, or an addisinism.

6. It is also suggested that familial erythremia represents a disease in which there is a disturbance in the factor of hemolysis of red blood cells and that some alteration of this phenomenon is the etiological factor in producing the disease.

7. It is also suggested that familial polycythemia vera may represent the antagonistic phenomenon to congenital familiar jaundice.

References

1. Bloomfield, A. L., and Keefer, C. ·S.: Clinical studies of gastric function. Jour. Am. Med. Assn., 88:707, 1927.
2. Brondes, T.: Ueber die Beziehung der perniziosen Anämie zum Magencarcinom. Med. Klin., 17:189, 1921.
3. Castle, Wm. B.: Observations on etiological relationships of achylia gastrica to pernicious anemia. Am. Jour. Med. Sci., 178:748, 764, 1929.
4. Cornell, B. S.: Etiology of pernicious anemia. Medicine, 6:387, 1927.
5. Dennig, H.: Perniziose Anamie nach Magenresektion. Munch. Med. Wchnschr., 76:633, 1929.
6. Ederle, W., Kriech, H., Gansslen, M.: Behandlung der Anæmia Perniciosa mit Injizierbarem Magenextrakt. Klin. Wchnschr., 101:313, (Feb.) 1931.
7. Goldhamer, S. M.: The pernicious anemia syndrome in gastrectomized patients. Surg., Gyn. & Obst., 57:2, 1933.
8. Hartman, H. R., and Moynihan, B. G. A.: Blood changes in a gastrectomized patient simulating those in pernicious anemia. Am. Jour. Med. Sci. 462:201, 1921.
9. Hurst, A. F.: Achlorhydria, its relation to pernicious anemia and other diseases. Lancet, 1:111 1923.
10. Levine, S. A., and Ladd, W. S.: Pernicious anemia. Bull. Johns Hopkins Hosp., 32:254, 1921
11. Morris, R. S.: Erythremia. Jour. Am. Med. Assn., 101:200, (July) 1933.
12. Morris, R. S., Rich, M. L., Schiff, L., Foulger, J. H., and Felson, H.: Observations on addisin in diseases of the blood. Annals of Int. Med., 6: 1535, 1933.
13. Morris, R. S., Schiff, L., Burger, G., and Sherman, J. E.: A specific hematopoietic hormone in normal gastric juice. Jour. Am. Med. Assn., 98:1080, 1932.
14. Morris, R. S., Schiff, L., Burger, G., and Sherman, J. E.: The hematopoietic response in pernicious anemia following the intramuscular injection of gastric juice. Am. Jour. Med. Sci., 184:778, (December) 1932.
15. Morris, R. S., Cchiff, L., and Foulger, M. Erythremia (polycythemia vera): a theory regarding etiology. Jour. of Med., (August) 1932.
16. Morris, R. S., Schiff, L., Foulger, J. H., Rich, M. L., and Sherman, J. E.: Treatment of pernicious anemia. Jour. Am. Med. Assn., 100:171, (January) 1933.
17. Moynihan, B. G. A.: A case of complete gastrectomy. Lancet, 2:430, 1911.
18. Riley, W. H.: Achlorhydria preceding pernicious anemia. Jour. Am. Med. Assn., 85:1908, 1925.
19. Spodaro, A., and Forkner, C. E.: Benign familial polycythemia. Arch. Int. Med., 52:593, (October) 1933.
20. Strauss, A. A., Meyer, J., and Bloom, A.: Gastric polyposis. Am. Jour. Med. Sci., 176:681, 1928.
21. Tuchfeld, F.: Ulcus duodeni und Polyglobulie. Zur Frage: Magenfunktion und rotes Blutbild. Med. Klin., 27:130, (Jan. 23) 1931.

IDIOPATHIC HYPOCHROMIC ANEMIA*

SAMUEL H. BOYER, Jr., M.D.

Duluth

SINCE 1554 when Johannes Lange[9] described chlorosis using the term "De Morbo Virgineo," and 1822 and 1826 when James Combe[10] and Thomas Addison,[11] respectively, described the condition which was later to be called pernicious anemia, until recent years it has been customary to classify anemias broadly as primary and secondary. The former included those whose cause was unknown or in doubt and was typified by a blood picture in which the red cells were reduced out of proportion to the hemoglobin, yielding a color index, therefore, greater than unity. The secondary type was characterized by a reduction of hemoglobin out of proportion to the red blood cell reduction and with a color index less than unity. After 1877 when

---

*Read before the Northern Minnesota Medical Association, Brainerd, Minn., September 10, 1934.

Samuel Fenwick added to our knowledge of pernicious anemia by demonstrating achlorhydria in patients suffering from this type of anemia, it soon became universally accepted that achlorhydria was essential to the diagnosis of an anemia of the Addisonian type. However, when Castle and his co-workers[2] demonstrated a constant lack of an intrinsic or extrinsic factor, as the case may be, in pernicious anemia and its related anemias a complete revision in the classification of anemias was necessary. Faber[6] called our attention to the existence of an anemia, which was not pernicious anemia, but which was accompanied by an achlorhydria or hypochlorhydria. With the knowledge that some anemias are characterized by an achlorhydria or hypochlorhydria, we are therefore entitled to classify anemias today as achlorhydric or deficiency anemias and non-achlorhydric or non-deficiency anemias. Into the latter group will fall such anemias as those due to blood loss from hemorrhage, malignant disease, nephritis, toxemias, infectious disease, etc. The former group may in turn be divided into two broad classes, the first including pernicious anemia and its related anemias, and the second including a type characterized by hypochlorhydria or achlorhydria, a low color index, a low icteric index and which responds to inorganic iron therapy. This we have chosen to term idiopathic hypochromic anemia.

The latter type of anemia has had a multiplicity of names, including achylia chloranemia, chronic hypochromic anemia, simple anemia, simple hypochromic anemia, simple achylic anemia, microcytic anemia, chronic chlorosis, achlorhydric anemia and primary hypochromic anemia. It is important that with this maze of terminology we do not confuse ourselves, but that we remember all are one and the same disease entity. As suggested previously it was only early in this century that achlorhydria had been associated with an anemia other than the Addisonian type. Subsequently Vinson[17] after the work of Patterson[15] and Kelly[8] described a type of dysphagia which was associated with anemia and achlorhydria. Since that time, and especially since Castle's work,[2] there has been an increasing amount of attention paid to this syndrome.

Contrary to the usual procedure it seems best to first describe the signs and symptoms and then the etiology. The patients are usually women who present themselves during the fourth or fifth decade of life with a chief complaint of weakness, anemia, peplessness or "being all tired out." In Witt's[18] classic description he presents fifty cases, forty-nine of whom were females, with an average age of thirty to fifty years, but with no racial predilection. The patients may also state that friends have told them they are pale, and that they become dyspneic upon slight exertion. They tire easily and may often note that the tongue has been sore. At times they may complain of paresthesias and of various digestive disorders such as anorexia, diarrhea or constipation. Often there is menorrhagia and frequently this may be taken as the cause of the anemia. In brief, then, the patients' symptoms may be divided into the anemic and digestive types. If one delves further into the history he will find that the patient has subsisted, in many instances, upon a diet characterized by a paucity of meat, green vegetables and fresh fruits, but with a high carbohydrate element. The diet, then, though ample in caloric value, has been deficient in hemoglobin building foods.[4]

To physical examination the patient more often than not appears to be well nourished. The skin is definitely pallid, not the classical lemon yellow tint of pernicious anemia nor the historical green of chlorosis, but has a "washed out" appearance not unlike the sallowness one sees in certain types of nephritis. The conjunctivæ and scleræ fail to show any icterus, but are instead pale and the latter often have a blue subtint. The tongue is frequently of the atrophic or bald type. Examination of the cardiovascular system reveals findings compatible with the degree of the existing anemia which are familiar to all of us. One particularly interesting feature is the brittle or so-called spoon nail. This is a finding practically diagnostic of this type of anemia. The spleen is often palpable, though usually not greatly enlarged.

The history and physical findings, with few exceptions, are therefore found to be not unlike those of pernicious anemia. Consequently we must turn to the laboratory to evolve a correct diagnosis. Gastric analysis reveals that achlorhydria occurs in the greater number of cases, although, as in pernicious anemia, there may sometimes be hypochlorhydria. More detailed examination will reveal an excessive amount of mucus and a diminution in the amount of pepsin.[5] The icteric index is found to be low or within the limits of normal. Examination of the urine does not often show the presence of urobilinogen. The most important procedure, the examination of the blood, shows a moderate reduction in the number of red blood cells and a proportionately greater reduction in the hemoglobin, thus yielding a color index less than unity. In the more advanced cases, the red blood cell count may be reduced to two or three million with a hemoglobin of thirty or forty. As a rule, however, the red blood cells average from three and a half to four million and the hemoglobin about fifty. The white blood cells are usually moderately reduced, but without the neutropenia which so frequently occurs in pernicious anemia. Microscopically the blood smear reveals a small red cell, which is hypochromic and uniform in shape. Occasionally there may be normoblasts, but on the whole there will be none of the characteristics of the pernicious anemia smear with marked variation in size and shape, normoblasts, reticulocytes, and the "old man" polymorphonuclear cell. Examination of the bone marrow from a patient with hypochromic anemia reveals a preponderance of erythroblasts, not the megaloblasts one finds in pernicious anemia. We thus have an erythroblastic type of anemia. We now have before us the picture of a patient suffering with idiopathic hypochromic anemia.

It has been found that this type of anemia responds well to inorganic iron, but not to liver. This response indicates a defect in the ability of the individual to utilize organic iron.[5] Dameshek[3] feels that there is an inadequate response on the part of the stomach and a failure to properly digest organic iron, leading to poor hemoglobin formation and defective maturation of the erythroblast. He feels this condition to be made worse or intensified by an insufficient diet, dysphagia and such conditions as pregnancy, myxedema, chronic blood loss and intestinal parasitism. Mettier and his confrères[12] have found that patients with this disease respond to large doses of inorganic iron, but do not respond to a diet wealthy in organic iron. However, upon feeding a predigested meal rich in organic iron and possessing an acid reaction, they obtained a satisfactory response in blood and hemoglobin. They therefore believe that idiopathic hypochromic anemia is due to an iron deficiency brought about by a gastric dysfunction which results in a failure of the use of organic iron. It would therefore appear that in hypochromic anemia we are dealing with a deficiency disease, in which because of deficient gastric ability to handle organic iron there is a lack of iron absorption and therefore a reduction in hemoglobin and a depression in the maturation of the erythroblasts.

Because of the frequent occurrence of menstrual disturbances some authors have believed there to be a relationship between menstruation and this type of anemia.[1] However, when one considers that this anemia occasionally does occur in the male and that it has been definitely associated with an iron deficiency, the menstrual relationship does not seem plausible. Dameshek,[3] quoting Suzman, states that there is hyperkeratinization of the epithelium of the tongue, hypopharynx and esophagus in the so-called Plummer-Vinson syndrome and that this is a manifestation of iron deficiency brought about by gastric dysfunction. Davies[5] also feels that these findings as well as the brittle finger nails are signs of iron deficiency and therefore anemia with resultant trophic changes. The latter author, with others, has found a number of patients with idiopathic hypochromic anemia who at an earlier date have had gastric operations, such as gastric resections and gastro-enterostomies, with slowly developing gastric dysfunction and anemia. This latter condition emphasizes the theory of gastric deficiency with faulty iron absorption as the etiology of the anemia.

Hypochromic anemia, as well as pernicious anemia, may occur in pregnancy. As gastric inability to utilize organic iron may occur in varying degrees, *i.e.*, it may be relative or absolute, it is more likely that when the presence of the fetal organism exerts an increasing demand for iron, there is an inability on the part of gastric function to meet the demand of the two organisms and therefore anemia results.

One should not pass over the subject of idiopathic hypochromic anemia without reference to its relationship to pernicious anemia. Heath[7] is one of the numerous observers who have found both conditions with achlorhydria existing in the same family. Nor should one forget the previously mentioned but almost forgotten and seldom seen chlorosis. The question arises, is this one and the same disease? On the one hand chlorosis occurred in young girls at the age of puberty, the skin was greenish in hue, the appetite was capricious, and there was hyperchlorhydria; while in idiopathic hypochromic anemia we find the age to be somewhat older, the skin is not of greenish tint and there is either a hypo- or achlorhydria. However, both respond to iron therapy. Bloomfield[1] believes that menstrual disturbances may be a cause common to both. Stockman[16] does not believe the two are related, but that chlorosis occurred in young girls whose dietary was faulty and who immediately responded to a diet rich in iron. The latter factor would seem to indicate that the two are not the same, for patients with idiopathic hypochromic anemia do not respond to diets rich in iron without the inorganic substance being present.

The treatment of hypochromic anemia has already been alluded to, namely, inorganic iron, in large quantities. Nowadays it is customary to give from 60 to 120 grains of iron daily. This may be given in various forms. The favorite of many is iron and ammonium citrate, usually prescribed in aqueous solution. Reduced iron in doses of 60 to 80 grains daily is of value. Saccharated ferrous carbonate in twenty grain doses four times a day in capsules, is particularly effective. In prescribing the various iron compounds it is important to remember that it is essential to supply at least one gram of metallic iron daily and that the iron content of the different preparations varies. Reduced iron contains 78 per per cent, iron and ammonium citrate 17 per cent and saccharated ferrous carbonate about 60 per cent. The diet should be a highly nutritious one and should contain an abundance of meat, fresh fruits and vegetables. Opinion varies as to the advisability of prescribing hydrochloric acid. Witts feels that it has no effect upon the anemia but that it does benefit the digestive symptoms. The work of Mettier and Minot[13] would indicate that a better response to iron is obtained when it is administered in a medium of high acidity. To me, hydrochloric acid seems to be beneficial in giving a more rapid response to therapy. When one does prescribe dilute hydrochloric acid it should be given in dram doses to be sipped in water or sweetened orange juice during meals. Doses of less than a dram do not appear to be helpful. Recently Minot and Patek[14] have obtained a satisfactory response from feeding concentrated bile pigment of low iron content. It is their belief that the deficient material may be supplied by bile pigment as well as by iron.

To illustrate what has been said about idiopathic hypochromic anemia, I wish now to present two case records.

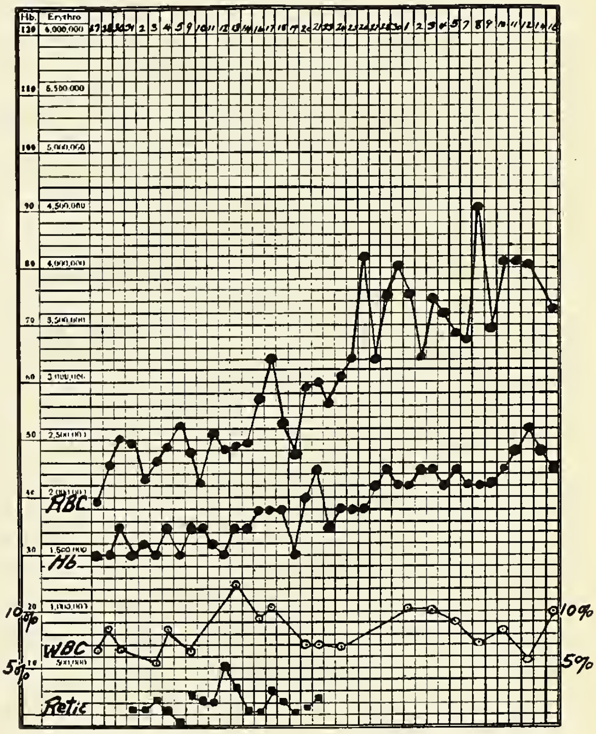


Fig. 1. Chart indicating rise of red blood cells, hemoglobin and the reticulocyte response.

The first patient was a white female sixty years of age whose chief complaint was weakness. She dated the onset of her symptoms to 1930, at which time she noted pallor, dyspnea and a sore tongue. She later noted early satiety, constipation, tachycardia, edema and nocturia. The past medical history was important because it revealed that a gastroenterostomy had been performed for a gastric ulcer in 1918. Since the onset of her illness she had received liver both orally and parenterally.

Physical examination revealed a well developed, well nourished white female who appeared tired. The skin was pale. There was puffiness about the eyes, the tongue was bald, the heart was slightly enlarged, there was a systolic murmur at the apex and at the base. There was moderate peripheral sclerosis. The pulse rate was 88, regular and of good volume. The blood pressure was 130/75. The liver edge was just palpable.

The urine was normal. The red blood count was 1,940,000, the hemoglobin 30 per cent and the color and volume indices both 0.8. The icteric index was 4, 4 and 6 upon three occasions. The stool was negative for ova and parasites and upon one occasion was positive for blood by the guaiac test and also for urobilinogen. Gastric analysis showed a total acidity of 18 degrees and an achlorhydria. A gastro-intestinal x-ray showed a well functioning gastro-enterostomy with a narrow antrum.

Our impression at the conclusion of our studies was idiopathic hypochromic anemia. The patient was placed upon saccharated ferrous carbonate twenty grains four times a day and dilute HCl, one dram t.i.d. Because of the excessively low red count she was also given 3 c.c. of Lilly's liver extract 343 intramuscularly every five days for five doses. Despite this intensive therapy she did not experience a reticulocyte response until the thirteenth day, whereas commonly the response occurs between the fifth and ninth. Because of the history of gastric ulcer, malignancy was suspected, but a repeated negative x-ray study, together with the lack of other symptoms and finally the response, satisfied us that malignancy was not present. Upon discharge two months after admission her red count was 4,050,000 and her hemoglobin 48 per cent. Figure 1 demonstrates the response graphically.

This case is of particular interest because of the history of gastric ulcer and subsequent gastro-enterostomy. We have already learned that such surgery may precede the development of anemia. The possibility of malignancy in these cases must always be considered and every effort directed to ruling it out. Paradoxically to what has been said, liver was administered to this patient. When a count is as low as that noted every effort must be given to boosting that count. Theoretically liver does no good, but occasionally a mixture of the two types of anemia is encountered and mixed therapy may help. It is a moot question in my mind whether liver therapy was of benefit here. I wish to call your attention to the fact that this case was first diagnosed as pernicious anemia but that that diagnosis had to be revised when the laboratory work was completed. This is an oft repeated mistake made in the absence of careful study of the blood, hence an unnecessary one.

Our second case is that of a white female forty-eight years of age whose chief complaint was weakness. History of the illness revealed that she dated the onset, which had been very insidious, to about five years before and the exact symptoms could not be recalled. However, a year later, she became so edematous and weak during a pregnancy that it was necessary to terminate the pregnancy. Sterilization was performed at the same time. Following this she irregularly took medicine for anemia. She gained some weight. In January, 1933, she again became weak and was given a blood transfusion. During the winter of 1933-1934 weakness returned and persisted until the time I saw her. Other symptoms included vertigo, occasional tinnitus, a frequently sore tongue, dyspnea, palpitation and arrhythmia upon exertion. There had been edema of the legs at night, jaundice of several years' duration, diarrhea, difficulty in swallowing solid foods, a dietary which excluded proteins and tended to a high carbohydrate type. Past medical and social history were irrelevant. Family history indicated that her mother had died of anemia.

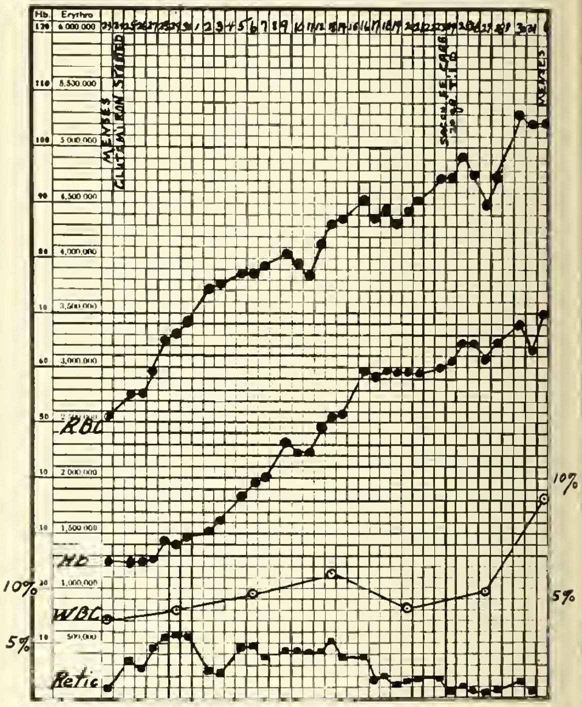


Fig. 2. Chart indicating response of red cells, hemoglobin and reticulocytes to iron therapy.

Physical examination revealed a small, well developed but well nourished white female about forty-eight years of age. The skin at first gave the impression of jaundice, but on closer inspection no true icterus was evident, but rather a sallow appearance. There was generalized pallor of the skin and mucous membrane, some pitting edema of the legs, the tongue was atrophic in type, thyroid was palpable, the lungs were normal with the exception of a few râles at the bases posteriorly, the heart was not enlarged, there was a systolic murmur at the apex widely transmitted. The pulse rate was 90 and regular, the blood pressure was 110/64. The liver edge was palpable and the spleen was palpable five centimeters below the costal margin. The nails were thin, friable and spoon shaped.

Laboratory examinations included urinalysis, which was negative. The red blood cell count was 2,500,000, hemoglobin 25 per cent and the color index 0.5. The white blood count was 3,500 with 62 per cent neutrophiles and 38 per cent lymphocytes. There were no reticulocytes. Gastric analysis revealed a total acidity of 14 degrees and no free acid. The icteric index was our. X-ray studies of the gastrointestinal tract were egative; parasites and blood were absent from the tools.

In this case again the differential diagnosis included ernicious anemia and idiopathic hypochromic anemia. survey of the history shows that the patient was ick for five years with periods of remissions and exacerbations, during which time she was extremely ill uring a pregnancy. There was a history of a dislike nd failure to eat such foods as green vegetables, resh fruits and meats. The physical examination rought out the important points of pallor, without cterus, bald tongue, spoon nails, palpable spleen, edema and cardiac murmurs due to the anemia. The laboratory examination clinched the diagnosis of idiopathic hypochromic anemia by revealing the presence f reduction of hemoglobin out of proportion to the ed cell reduction, achlorhydria, an icteric index of 4 nd a color index of .5. The patient was placed upon lutamiron and rapidly responded to this therapy. Figure 2 indicates the beauty of the response with a total ncrease of red blood cells to 4,800,000 and a hemoglobin of 65 per cent in a little over a month's time.

In closing I wish to call your attention again o the importance of differentiating between pernicious anemia and idiopathic hypochromic anemia. The important points in history, physical examination and laboratory findings in hypochromic anemia have been noted above. It is essential to remember that in pernicious anemia here is missing an element which we know as he intrinsic factor, failure of which to interact ith the so-called extrinsic factor leads to failure of maturation of the megaloblast. In idiopathic hypochromic anemia there is also a gastric dysfunction whereby the human organism is nable to utilize organic iron in the diet, which n turn interferes with erythroblastic maturation nd we have a failure of hemoglobin production nd deficient red cell manufacture. Both, then, ay be termed deficiency anemias. Pernicious nemia responds to liver and other substances ontaining the intrinsic factor while idiopathic ypochromic anemia responds to large doses of norganic iron.

In the future we shall probably see many ore cases of idiopathic hypochromic anemia because we are better able to differentiate this condition from pernicious anemia and also because we will not ascribe what is apparently a secondary anemia to bleeding hemorrhoids, abnormal menstruation and similar conditions.

Bibliography

1. Bloomfield, A. L.: Relations between primary hypochromic anemia and chlorosis. Arch. Int. Med., 50:328, (Aug.) 1932.
2. Castle, W. B., Townsend, W. C., and Heath, C. W.: Relationship of achylia gastrica to pernicious anemia. Am. Jour. Med. Sci., 180:305, (Sept.) 1930.
3. Dameshek, W.: Primary hypochromic anemia. Jour. Am. Med., Assn., 100:540, 1930.
4. Davies, D. T.: Simple achlorhydric anemia. Lancet, 2:29, (Aug.) 1921.
5. Davies, D. T.: Studies on achlorhydria and anemia. Quart. Jour. Med., 96:447, (July) 1931.
6. Faber, K.: Anamische Zustande bei der chronischem Achylia Gastrica. Berl. klin. Wchnschr., 50: 958, (May 26) 1913.
7. Heath, C. W.: The interrelationship between pernicious anemia and idiopathic hypochromic anemia. Am. Jour. Med. Sci., 185:365, (March) 1933.
8. Kelly, A. B.: Spasm at the entrance of the esophagus. Jour. Laryngol. and Otolaryngol., 34:285, (Aug.) 1919.
9. Major, R. H.: Classic Descriptions of Disease, Springfield, Ill. C. C. Thomas, 1932, p. 445.
10. Major, R. H.: Ibid, p. 447.
11. Major, R. H.: Ibid, p. 251.
12. Mettier, S. R., Kellog, F., and Rinehart, J. F.: Chronic idiopathic hypochromic anemia. Am. Jour. Med. Sci., 186:594, (Nov.) 1933.
13. Mettier, S. R., and Minot, G. R.: The effect of iron on blood formation as influenced by changing the acidity of the gastro-duodenal contents in certain cases of anemia. Am. Jour. Med. Sci., 181:25, (Jan.) 1931.
14. Patek, A. J., Jr., and Minot, G. R.: Bile pigment and hemoglobin regeneration. Am. Jour. Med. Sci., 188:206, (Aug.) 1934.
15. Patterson, D. R.: A clinical type of dysphagia. Jour. Laryngol. and Otolaryngol., 34:285, (Aug.) 1919.
16. Stockman, Ralph: Personal communication.
17. Vinson, P.: Hysterical dysphagia. Minn. Med., 5:107, 1922.
18. Witt, L. J.: Simple achlorhydric anemia. Guy's Hospital Reports, 80:253, 1930.

ASCITES OF INDETERMINATE ORIGIN*

MELVIN W. BINGER, M.D., and NORMAN M. KEITH, M.D.
Rochester, Minnesota

WHEN we consider that ascites is a result of disease and not a disease in itself, and that definite abnormal physiologic processes have taken place to produce this condition, we are urged to ascertain by clinical and laboratory methods the underlying cause in order that our treatment shall be rational and our results satisfactory.

The commoner causes of ascites are myocardial failure, cirrhosis of the liver, tuberculosis of the peritoneum, malignant disease within the abdomen, nephritis, and polyserositis. However, we have had under observation eight patients with ascites, whose condition does not fit in with any of these just named, if we accept the generally recognized criteria for diagnosis (Table I). Five of these patients are males and three females. Their ages ranged from seventeen to sixty-nine years, and six of them were between the ages of thirty-eight and fifty-five years. The onset of ascites varied from two to nine months before registration, and on examination there was associated edema of the lower extremities, graded 1 to 3. None of the patients had hypertension, nor did any give evidence of gross arteriosclerosis. Examination of the fundus was carried out in six cases, and nothing essentially abnormal was noted. There was neither subjective nor objective evidence of myocardial disease. The liver was not strikingly enlarged or abnormally hard, although it was palpable in three cases. In none of the cases was there the visible collateral abdominal venous circulation so frequently seen in patients who have cirrhosis of the liver. There was no history of hematemesis, or other evidence of esophageal varices. All of the patients gave evidence of having some tendency to anemia, but in only one case was anemia marked. Jaundice was absent. The concentration of serum bilirubin was normal. Tests of hepatic function were made in seven cases; they revealed no retention of dye in five cases, and retention of dye graded 1 in two cases. With such findings, evidence was lacking to sustain a diagnosis of hepatic cirrhosis.

The possibility of tuberculous peritonitis was considered in all of the cases. In five cases laparotomy was done and later, in two of these, necropsy was performed; evidence of tuberculosis was not found. In the other cases, the course, history and findings could not justify a diagnosis of tuberculosis. That we might be dealing with cases of intra-abdominal malignancy was considered. In five cases this condition was excluded by abdominal exploration, necropsy, or continued good health for six to eight years. In Case 5, discrete, enlarged mesenteric lymph nodes were found, but a positive diagnosis of intra-abdominal malignancy was not made. In Case 6 a tumor of the stomach was suspected after roentgenologic diagnosis, but a positive diagnosis was not made. The patient's condition did not permit of exploratory operation. Malignant disease probably was present in this case (Tables I, II and III). Chronic glomerulonephritis or lipoid nephrosis was considered, but the negative urinary findings ruled out such a diagnosis in seven cases. In a single, Case 1, the value for blood urea rose to 149 mg. per 100 c.c. following twelve intravenous injections of salyrgan (12.5 c.c.), 74 gm. of ammonium nitrate, and 6.0 gm. of euphyllin (Tables II, IV and V). Later, however, the value for urea dropped to normal; urinalysis gave negative results, and has continued to do so since. This patient, nine years previously (1918) had undergone left nephrectomy for left nephrolithiasis with functionless left kidney, and at that time a diagnosis of right pyelonephritis had been made. This patient, eight years after the occurrence of ascites, is alive, well, and working. It is possible, but not likely, that renal insufficiency produced the ascites. That these patients did not have polyserositis would seem to be apparent by the absence of fluid or other inflammatory changes in the pericardial and pleural cavities.

The ascites in all of these cases was the dominant feature. Some edema also was present, but was confined to the lower extremities and prob-

---

*From the Division of Medicine, The Mayo Clinic, Rochester, Minnesota. Read before the meeting of the Minnesota State Medical Association, Duluth, Minnesota, July 16, 1934.

TABLE I. INDETERMINATE ASCITES: GENERAL DIAGNOSTIC FEATURES

Case	Date	Age, years and sex	Duration since onset, months	Liver edge palpable cm. below the costal margin	Edema, grade	Basal metabolic rate	Liver function dye retention, grade	Comment
1	3- 7-27	47M	9	2	1		0	Right pyelonephritis
2	4-27-28	39F	5	0	3		0	
3	11- 4-27	55F	4	0	1		0	
4	12-11-29	49F	7	0	3			
	10-24-31	51	29	0	0		0	
5	2-16-29	47M	2	0	2		0	
6	9-26-25	69M	6	0	2	—16	1	Tumor at angle of stomach (?)
7	2-26-30	17M	6	6	3	—22 —18 — 7		Acromegaly (?)
	8-28-30		12	2	0	— 7	4	Intermittent fever
8	9-14-26	38M	9	9	1		1	Intermittent fever

In all cases the blood pressure was within normal limits. Ascites present and no demonstrable abdominal collateral circula- on, no jaundice. Serum bilirubin normal.

TABLE II. INDETERMINATE ASCITES: RESULTS OF TREATMENT

Case	Days in hospital	Maximal diuresis	Weight loss, pounds	Ascites after treatment	Toxic reactions	Immediate results	Living and well after six years	Dead	Duration of life from onset, months
1	28	2400	28.0	0	Blood urea, 149 mg. per cent	Good	+		
2	43	2700	28.0	0	0	Good	+		
3	23	1700	47.0	0	0	Good	+		
4	10	3600	?	0	Mercury dermatitis (?)	Good			
	8	1600	20.0	0	0	Poor		+	29
5	22	3050	27.5	+		Poor		+	8
6	59	4800	41.0	+	0	Good		+	10
7	11	1700	20.0	0	0	Good			
	17	1000	8.0	0	0	Good		+	18
8	32	10000	8.0	0	0	Poor		+	10

bly was secondary to the intra-abdominal con- ition. Estimation of certain constituents in the lood gave practically normal values in all cases. he exceptions were in Cases 1 and 7 (Table V). In the former, the value for urea was ormal before treatment, but, as previously has een noted, rose to 149 mg. per 100 c.c. following the use of diuretics. In Case 7 the value for erum protein was definitely reduced to 4.6 gm. er 100 c.c. Later severe hepatic insufficiency eveloped in this case, as is indicated by retention of dye grade 4 (Tables I, II and IV). Salvesen, and Bennett and associates have reported a decreased concentration of serum protein in hepatic disease.

Operative and Pathologic Findings

In the five cases in which exploration was made, very enlightening data were obtained, both of negative and of positive value (Table V). In Case 2 the peritoneum was normal and glistening in appearance. A large amount of ascitic fluid was present. The right oviduct and ovary had been removed at a former operation. There was evidence of a previous pelvic inflammatory condition, and the stump of the left oviduct, and the left ovary, formed a necrotic mass of tissue. Inoculations of guinea pigs, and direct examination of the fluid were negative for bacilli of tuberculosis. Following this operation, ascitic fluid re-accumulated, necessitating several aspira-

TABLE III. INDETERMINATE ASCITES: CAUSE OF DEATH

4	Thrombosis of portal vein with atrophy of liver. Acute infarct of jejunum with hemorrhage
5	Unknown; possible intra-abdominal malignancy
6	Unknown
7	No necropsy. Meningitis (?), secondary to sinus infection
8	Abscess of liver

tions. Treatment with diuretics was subsequently successful.

The findings in Case 3 were interesting. The liver was normal, with no evidence of cirrhosis. The peritoneum was of normal appearance. A cystic tumor of the right ovary, measuring 12 by 15 cm., and weighing 45 gm., was composed of a teratoma, a fibroma, and a mass of tissue which grossly and microscopically resembled adult and fetal thyroid substance with some portions of undifferentiated, fetal thyroid tissue. Also, some portions resembled exophthalmic goiter. However, clinically there was no evidence of hyperthyroidism. There was considerable inflammatory reaction where the tumor was attached in the culdesac, and it was thought possible that this could have been the irritant that produced the ascitic fluid. There was no histologic evidence of malignancy.

On exploration in Case 4, a large amount of milky fluid was drained out, and a tumor was removed which proved to be a left, multilocular ovarian cyst, measuring 14 to 8 by 7 cm. and weighing 210 gm. It contained colloid and fetal thyroid adenomas. With these findings it is interesting that the patient gave no clinical evidence of having hyperthyroidism. Malignant cells were not found. Following the operation, the ascites recurred, necessitating abdominal paracentesis every ten to fourteen days. At these aspirations, from 9,500 to 17,400 c.c. of clear, straw colored fluid were obtained. Eleven months later a second exploratory operation was done, but nothing abnormal was found. Three weeks later severe abdominal pain developed, and this was followed by profound shock, from which the patient did not recover; death ensued fifteen hours later. Necropsy revealed thrombosis of the portal vein, with atrophy of the liver, acute infarction of the jejunum, and hemorrhage (Table III). The liver weighed 1,560 gm.; the spleen was atrophic, weighing only 35 gm.; the kidneys weighed 305 gm. The histologic findings in the liver and kidneys were described by Dr. D. C. Beaver of the section on pathologic anatomy: The liver was almost normal in appearance; there was mild congestion of the sinusoids, and fatty infiltration. No real cirrhosis was present, but in an occasional interlobular zone there was slight increase of connective tissue elements, and in some parts of the liver the interlobular spaces were somewhat increased, and the capsule was of increased thickness. All of the connective tissue changes were the result of focal atrophy of hepatic parenchyma. In the kidneys were local regions of parenchymal atrophy within the cortex, especially in the subcapsular portion, with replacement of connective tissue; otherwise the kidneys were essentially normal. This cortical change may have been provoked by pyelonephritis in the past, which later had become entirely healed. It did not appear to be the result of vascular disease.

On abdominal exploration in Case 5, about 700 c.c. of chylous fluid was removed. Palpation in the region of the liver revealed a thickened gallbladder, and a discrete nodule about 1.5 cm. in diameter. There were several small, indurated lymph nodes along the common bile duct, which varied in size from 1 to 1.2 cm. in diameter. The right kidney was enlarged to about three or four times normal size, and felt as if it were hydronephrotic. In the mesentery of the intestine could be felt numerous discrete lymph nodes, approximately 1 to 1.5 cm. in diameter. No single tumor blocked the flow of chyle. Tissue for biopsy was not obtained, and it was questionable whether the lymph nodes had undergone inflammatory or malignant change.

In Case 8 the gallbladder, which contained stones, had been removed twelve months previously, at which time subacute hepatitis, grade 4, had been observed. At the time of the exploration to determine the cause of the ascites, there was about 1 liter of straw colored fluid in the abdominal cavity. The liver and spleen were very large, the liver extending 4 inches (10.0 cm.) below the costal margin, and the spleen was about three times normal size. Tissue from the liver, on microscopic examination, was reported to give evidence of hepatitis, grade 2, and of fatty degeneration, grade 2. The pa-

TABLE IV. INDETERMINATE ASCITES: LABORATORY DATA

	Blood							
				Plasma		Serum		
Case	Hemoglobin, per cent, Dare	Erythrocytes, millions	Urea, mg. per cent	Chlorides, mg. per cent	Carbon dioxide combining power, volumes, per cent	Protein, gm. per cent	Albumin-globulin ratio	Phenolsulphonphthalein, per cent
1	60	3.34	22	590	46	5.9		45
2	72	4.20	12	636	68	5.6	1:0.8	50
3	68	4.76	32	645				55
4	80	4.92	38					80
	73		24	594		6.2	1:1.3	40
5	80	4.19	20		65			70
6	67	3.09	40	600	54			40
7	74	3.87	22	639		4.6	1:1.0	80
	72	4.49	18					
8	34	1.92	19	580	50			
	47	3.04						

Routine urinalysis essentially negative in all cases.

TABLE V. INDETERMINATE ASCITES: TREATMENT

Diuretic and surgical

Case	Ammonium nitrate, gm.	Ammonium chloride, gm.	Organic mercury, c.c.	Fluid removed by abdominal paracentesis, c.c.	Surgery	Operative findings
1	74		12.5			
2	195		10.5	Large amount	Laparotomy	Pelvis inflammatory, not tuberculous
3	90		2.5		Right oophorectomy	Cyst contained fetal and adult thyroid and exophthalmic goiter tissue
4	28		5.0	11,700	Laparotomy; Left oophorectomy	Multilocular cyst of left ovary containing adenomatous thyroid tissue
	26			9,500	Laparotomy	Negative abdominal exploration
				11,000		
				11,700		
				11,000		
				17,400		
5	112		3.5	700	Laparotomy	Abdominal exploration, chylous ascites, numerous discrete nodes in mesentery; no blocking of chyle
6		264	6.5			
7	86		1.5			
	66		0.5			
8		58	1.5	1,000	Laparotomy	Liver and spleen enlarged; subacute hepatitis

ient died three days later and a large pyogenic bscess of the liver was found, containing 1,000 .c. of greenish-yellow pus. It was not an amebic bscess or an echinococcus cyst (Table III). he weight of the liver was 4,250 gm., of the pleen, 1,125 gm., and of the kidneys 600 gm. icroscopic examination of the liver disclosed moderate degree of passive congestion and fatty degeneration. Regions of acute infarction were present. The abscess presented the usual picture of necrosis resulting in atrophy and disorganization of parenchyma, with increase of connective tissue but no cirrhosis. The renal glomeruli were extremely large, and their large, patulous capillary loops were engorged with blood. The epithelium of the cortical tubules

TABLE VI. INDETERMINATE ASCITES: TREATMENT

Diet

Diet and fluid intake

Case	Sodium chloride content	Protein, gm.	Fluid in food, c.c.	Extra fluid intake, e.c.	Total fluid intake, c.c.
1	Weighed ionic *	40	800	800	1600
	Salt free †		1200	1200	2400
2	Weighed ionic	50	800	600	1400
	Low salt ‡		1200	600	1800
3	Weighed ionic	40	800	800	1600
	Salt free	60	1200	800	2000
4	Low salt	50	1200	1200	2400
	Salt free	50	1200	800	2000
	Low salt				
5	Weighed ionic	50	800	1000	1800
	Salt free		1200	1000	2200
6	Low salt	50	1200	1200	2400
7	Salt free	50	1200	800	2000
	Salt free	50	1200	600	1800
8	Low salt	60	1200	2500	3700

*Sodium chloride content approximately 1.0 to 1.5 gm.
†Sodium chloride content approximately 2.0 to 3.0 gm.
‡Sodium chloride content approximately 4.0 to 5.0 gm.

was swollen, and sometimes vacuolization and granular degeneration of the cytoplasm of cells were seen. The findings were those of hypertrophy of the glomeruli and mild tubular degeneration.

Treatment

All patients were observed in the hospital. Diets were controlled. They were low in content of salt or were salt-free, and contained protein in the amount of from 40 to 60 gm. daily. The intake of extra fluid was controlled, and varied from 600 to 2,500 c.c. per day, totalling, with the fluid of the food taken, to from 1,400 to 3,700 c.c. daily (Table VI).

Diuretics used consisted of ammonium nitrate or ammonium chloride, 8 to 12 gm. per day, together with organic compounds of mercury given intravenously in doses of from 0.5 to 2.5 c.c., at intervals of several days. Derivatives of theobromin were not used extensively in this group of cases, for there seemed to be no contraindication to the use of the more powerful diuretics (Table V).

Abdominal paracentesis was done in four cases, and in one case (Case 4) this was performed six times. Some of the fluids obtained were clear and amber colored; some were chylous. The amount of fluid varied from 700 to 17,400 c.c. Abdominal exploration was carried out in five cases, as previously has been mentioned (Table V).

Results of Treatment

The immediate result of treatment was considered good in five cases and poor in three cases (Table II). In one of the latter three cases, the response was good on the patient's first visit, but subsequently she reacted poorly. In two of the latter three cases the patients died while in the hospital. However, in only two cases was there any demonstrable ascites at the time of dismissal. Loss of weight ranged from 8 to 47 pounds (3.6 to 21.3 kg.), a mean of 27½ pounds (12.4 kg.). The maximal diuresis following the administration of diuretics ranged from 1,000 to 10,000 c.c. in twenty-four hours, and in only three cases was it below 2,000 c.c.

Three patients are living and well after six years. The five who died lived from eight to twenty-nine months after the onset of symptoms, and of three of these the cause of death is unknown.

Comment

It would appear from these studies that ascites can be produced by factors other than those that can be determined by available physical or laboratory diagnostic methods. Often, abdominal exploration will assist in solving the problem, and usually it is not attended with serious undue risk to the patient.

Cases of ascites in which ovarian tumors are present occasionally have been reported. In Case 3 the ascites did not recur after removal of the teratoma of the right ovary. There was considerable inflammatory reaction around the site of the tumor and this may have been the cause of the ascites. In Case 4, however, the ascitic fluid re-accumulated after removal of a multilocular cyst of the left ovary, and on subsequent abdominal exploration, cause for the ascites could not be found. Later, at necropsy, portal thrombosis was found, as has been mentioned.

The actual pathologic physiology which produces the ascites in these cases still is not clear. It is striking that there was no good evidence of hepatic cirrhosis in any of these cases, and that this condition was definitely excluded by surgical exploration in five, and by histologic studies in two, of these cases. It is possible that congestion of the liver secondary to circulatory disturbances or toxic agents was important in some of these cases. Weir and Beaver have reported the presence of ascites in a series of cases in which, at necropsy, chronic portal thrombosis was found.

The ascites often can be successfully treated by careful dietary control, low intake of fluid, and the use of diuretics (Tables V and VI). We at present, prefer the use of potassium nitrate to ammonium nitrate or ammonium chloride, for it is less likely to produce toxic reactions, such as renal insufficiency, acidosis, or methemoglobinemia.[2] It can be given in doses of 8 to 12 gm. per day, in enteric coated pills, or it may be given in capsules or in 25 per cent solution. Organic compounds of mercury, such as salyrgan, are usually successful. An initial dose of 0.5 c.c. is given intravenously, and if no untoward reaction results, 2 c.c. may be given every three or four days. However, it should not be employed in the presence of distinct renal insufficiency or when gross hematuria is present. If the ascites cannot be controlled by such measures, abdominal paracentesis may be repeated when necessary.

Summary

Cases of ascites of indeterminate etiology do occur. Diagnosis is often difficult. Thorough clinical examination, including routine and special laboratory studies, is important. Paracentesis, and even abdominal exploration, may be necessary in order to establish a diagnosis. Treatment includes the use of suitable diets, diuretics, and surgical procedures. Recovery took place in a third of the patients of this series of cases.

Bibliography

1. Bennett, T. I., Dodds, E. C., and Robertson, J. D.: A study of plasmaprotein loss with edema, but without proteinuria and its bearing on the concept of nephrosis. Lancet, 2:1006-1008, (Nov. 8) 1930.
2. Binger, M. W., and Keith, N. M.: The effect of diuretics in different types of edema. Jour. Am. Med. Assn., 101:2009-2016, (Dec. 23) 1933.
3. Salvesen, H. A.: Variations in the plasma proteins in non-renal conditions. Acta med. Scandin. 72:113-123, 1929.
4. Weir, J. F., and Beaver, D. C.: Diseases of the portal vein: a review of 127 cases. Am. Jour. Digest. Dis. and Nutrition, 1:498-505, (Sept.) 1934.

AMEBIASIS: DIAGNOSIS, PREVENTION AND TREATMENT*

PHILIP W. BROWN, M.D., and THOMAS B. MAGATH, M.D.

Rochester, Minnesota

IN SPITE of the fact that the pathogenic ameba of man that Loesch first described was obtained from the stool of a patient in St. Petersburg, Russia, many physicians in temperate zones always have thought of amebiasis as a tropical disease. It is true that prior to 1911, when Sistrunk published his paper, no one had seriously considered the disease as being present in temperate zones. Since that time, many investigations have clearly demonstrated the rather widespread prevalence of amebiasis throughout the entire temperate zone. The exact incidence of the disease is, unfortunately, unknown, but judging from numerous special surveys made by different observers in the United States and abroad, it is more than likely that Craig's conclusion that amebiasis is prevalent in from 5 to 10 per cent of the population is amply justified. This, of course, does not necessarily mean that the level at which symptoms are present has been reached by anywhere near that percentage of persons, but, if stools are thoroughly examined, one might expect to find the average incidence of Endamoeba histolytica in the neighborhood of at least 6 per cent of persons taken at random.

---

*From the Division of Medicine and the Division of Clinical Pathology, Section on Parasitology. Read before the Minnesota State Medical Association, Duluth, Minnesota, July 16, 1934.

Diagnosis

It is patent that the absolute diagnosis of amebiasis is accomplished only when Endamoeba histolytica has been identified in the stools, tissues, or bodily discharges. It must at once be recognized that because of the possible presence of at least four other amebas, and several other protozoa, identification of Endamoeba histolytica must be made by those especially qualified to recognize the species. Unfortunately, medical schools do not teach students to identify these species with any high degree of accuracy and, to become qualified, one must spend a considerable period of time in training and study under someone who is expert in the identification of these species. Further, one must have access to a large amount of material in order to become experienced enough to be accurate.

Five major methods of diagnosis are available.

1. Direct examination of stools or bodily discharges may be made. As a general rule, cysts will be found in formed stools while in loose stools one may expect to find trophozoites. Fresh material containing cysts may be stained with Lugol's solution in order to study the number and structure of the nuclei.

2. Study may be made of stained specimens. This requires a considerable amount of training and experience in the preparation of proper slides and thorough knowledge of staining with iron hematoxylin.

3. Cultural methods may be used. In recent years, a large number of modifications of the original Boeck and Drbohlav medium, as well as other mediums, have been devised. In the hands of many, cultural methods have proved highly successful. However, one should have clearly in mind the fact that amebas growing in cultures present some very real difficulties in identification and that there has yet to be published a detailed description of amebas growing in cultures, correlated with experimental studies to prove their pathogenicity. Until this is done, the cultural method will have a serious drawback, and should be used only by those thoroughly familiar with all phases of the study.

4. Complement fixation may be employed. This method depends on the identification of antibodies in serum by means of an antigen made of an alcoholic extract of amebas obtained from cultures. The test is entirely too complicated, and the antigen too difficult to make, to advocate its use as a routine. However, if improvements and simplifications can be made, it promises to be an extremely useful test.

5. Endamoeba histolytica may be identified in tissues. This requires that the tissue shall be preserved in a suitable preserving medium, preferably Schaudinn's fluid, and at least some sections stained with iron hematoxylin. The lesions of amebiasis are not characteristic enough to be identified unless the organisms themselves are clearly seen. The criteria on which Endamoeba histolytica itself is identified have been thoroughly discussed in many standard textbooks, and will not require further elucidation here.

It is important, however, to call attention to the fact that in examining loose or liquid stools, it is imperative that the material be examined very fresh and that the stool be kept at body temperature from the time it is passed until the examination is made. In examining formed stools, these precautions are not necessary, but the stools should be as fresh as possible. It will require, according to Svenssen and Linders, at least ten negative, formed stools from a patient before protozoal infestation can be ruled out. Our experience has shown that in examination of a group of patients a single specimen from each, following administration of magnesium sulphate, will reveal about 80 per cent of infestations, that two stools from each patient will yield more than 95 per cent of infestations, and that three stools will yield approximately all infestations.

Transmission of Disease

The recent outbreak of amebiasis in Chicago strikingly called attention to the fact that only a few of the fundamental phases of the transmission of Endomoeba histolytica from one patient to another are known. Evidence supports the conclusion that normally the trophozoites multiply by division only in the body of the host, and that both encystation and excystation take place there also. It is further evident that the cyst is the stage in which the parasite is transmitted from host to host, and that development of the membrane of the cyst is a protective feature for the parasite. Experiments have demonstrated that if the cysts are washed free of fecal material, or are suspended in a great deal of water, they will survive in water for many weeks, and they may survive short periods of xposure to reasonably cold temperatures. It has lso been demonstrated that they will withstand igh concentrations of chlorine, and that the rdinary method of chlorinating water for domstic purposes in no way affects the viability of he cysts. In suitable experimental mediums, the ntire life cycle of the parasite may be carried ut, but there is no evidence that this takes lace in nature outside the body of the host. ll of the evidence points to the fact that the rophozoites cannot be transmitted from host to ost except by injecting them into the rectum. hose that might be swallowed are evidently detroyed in the upper part of the intestinal tract, he cyst alone being able to pass through the tomach and intestines unharmed. It is evident, herefore, that as long as the patient is having cute symptoms, or is passing loose stools, the rganisms present, which are usually trophozoites, are in no way dangerous to other individuals. It is only when the amebas are passed as ysts that the fecal discharges become a menace.

When excystation takes place, the four-daugher cell mass of protoplasm escapes through the uptured cyst wall and immediately begins to eed. Division of the nuclei takes place, and an ight-daughter cell metacyst forms. Each nuleus, with an accompanying bit of protoplasm, s eventually broken off and the eight new rophozoites settle down in a suitable region of tasis, or in a small crypt, or in a surface depresion in the bowel, and begin their surface attack n the mucosa from which eventually develops he more or less typical amebic ulcer.

It is by no means clear exactly how viable ysts find their way into a new host. In the ast, several methods have been considered imortant. It has been known for a long time hat the cysts of Endamoeba histolytica not only an be transmitted on the feet of flies to food ut may even be transmitted in the droppings of lies after the cysts have passed through the limentary tract of the insect. In 1916, an outreak in El Paso, which involved 118 cases was eported by Craig. The epidemic was traced to ransmission by flies, which were numerous in he camps at the time. No epidemic occurred in he civilian population of El Paso although the water supply was identical with that of the roops.

The transmission of amebiasis by carriers who might be handling food, or who in other ways contaminate the food or water ingested by others, has been considered of great importance. Recently, however, the experiments of Kaplan and the experience in the Chicago outbreak have caused considerable doubt to be placed on this means of transmission as a common method. Kaplan showed by a series of experiments that when fecal material contaminated with cysts of Endamoeba histolytica is placed on the fingers, all cysts die within five minutes and that practically all are dead within ten minutes. These experiments bring out very forcibly the fact that the cyst of Endamoeba histolytica is very quickly killed when it becomes dry, and that unless the food handler transmits cysts from his contaminated fingers to moist food within a very brief period of time, there is no chance of spreading the disease by that method.

The possibility of raw food, such as vegetables, transmitting viable cysts is also relatively remote, even though the vegetables are raised where excreta of man is used for fertilizer or where irrigation is by contaminated water. Unless these foods are kept moist, and are consumed fairly soon after gathering, the effect of drying and aging of the cysts will destroy them; thus protecting the person who ingests the food. If certain foods are grossly contaminated, it is possible that the disease might be transmitted by such means.

It is further evident, from the experiments of Walker and Sellard, and from those of numerous experimenters who used kittens as test animals, that a large number of cysts is required to produce infestation, and that transmission of a large number of viable cysts by contaminated hands is well nigh impossible. It must be, therefore, as McCoy has recently concluded, that carriers among food-handlers do not appear to be so much of a menace as they were once thought to be. This, furthermore, calls attention to the fact that no particular attention need be paid to contacts of either patients or carriers.

In the light of present knowledge, it would appear that the most probable common mode of transmission of the disease is through contaminated water. It is in this medium that cysts may live for a long time, and because of the large volumes of potable water consumed by individuals, it seems most likely that this is the major means of transmission of the disease.

It should be evident that the water supplies of many cities and towns, although rendered satisfactory by chlorination so far as bacterial contamination is concerned, are likely to contain viable cysts of Endamoeba histolytica. This is because sewerage is emptied into the same body of water from which the drinking water is derived. This applies to most communities of which the water supplies are lakes and streams; there are many such communities in the United States.

In the Philippine Insurrection, clear-cut evidence was obtained that contaminated water was responsible for the explosive and severe amebic dysentery which was encountered. Again, with the expeditionary forces in Egypt, the same observation was made. The evidence from the Chicago outbreak again intensifies the importance of the transmission of amebiasis by water for it was clearly shown that contaminated water within two hotels was responsible for the outbreak. This brings up once more the importance of sanitary engineering, not only in relation to amebiasis, but also in relation to other diseases.

Through the efforts of Mr. H. A. Whittaker of the Sanitary Division, and of Dr. A. J. Chesley, Executive Secretary of the State Board of Health, the State of Minnesota obtained some of the earliest laws governing cross connections of water supplies, and similar regulations have been passed by many other states and by the United States Department of Public Health. Nevertheless, cross connections between unsafe and safe water supplies, and between sewage systems and safe water supplies, are altogether too frequent. It is safe to say that there are but few large public buildings in this state in which at least one questionable water connection could not be found. It is not generally realized that failure of water pressure and flooding of sewer systems frequently cause water supplies to become contaminated and that the numerous plumbing fixtures in hotels, public buildings, and hospitals, as well as in private homes, often lead to serious cross connections.

Just how such cross connections might operate can be clearly understood from such observations as those of Morris, in Pasadena. He reported that in the residence of a physician an offensive condition of the water was noted on occasions. Investigation showed that the small sized piping and limited water pressure caused the content of the second floor siphon-jet toilet, with flush valve, to siphon into the water system whenever a toilet was flushed on the first floor. He also recorded an instance in which water was drawn, by back siphonage, from a toilet on a higher floor, into the kitchen sink. Finally, he described an occasion in which a plumber was called to a residence to open up an overflowing toilet on the second floor. The man closed a valve at the curb and opened a valve downstairs to drain the system. Much to his consternation, the highly offensive content of the toilet bowl was drained out through the flush valve into the rest of the system.

In further testing of valves of the sort mentioned it was shown that it made little difference whether the water entered the bowl at the top or at the side, or whether the valve was placed at a distance from the bowl or not. Bowls with siphon-jets could be back siphoned into the general water supply in thirty to forty seconds, at a high vacuum, and in less than five minutes when the suction was only 2½ inches. In the wash-down type bowls, without the siphon-jet, any contamination adjoining the under-rim water outlets is sucked back into the water supply by a siphon, even though the bowl is not stopped up.

Contamination of the sanitary water from this type of toilet may result even though the sewer line in the building is not plugged. Sometimes the sanitary sewers in the city streets become clogged and the sewerage backs up and overflows toilets, especially those situated in the basement. In some towns, the sanitary and storm sewers are connected, and during severe storms the sewers are so overtaxed that sewerage backs up. If draw-downs of water are made at these times, or if the pressure on the water supply line fails, the content of the sewer will be drawn into the sanitary water system.

Even under normal conditions, vacuums may be formed on the water lines of tall buildings and many times throughout the day momentary vacuums form even though the pressures on the top floors are as great as 10 to 15 pounds. This condition is caused by greater use of water on the lower floors or by a general drop in pressure on a portion of the distributing system. Any plumbing fixture which has an under-rim, or low bell type of feed, is potentially a source of contamination of water and should under no circumstances be permitted to remain in use.

It is possible that none of our modern methods of taking care of potable waters which involve sedimentation and filtration will completely remove amebic cysts, and chlorination will not kill them. At the present time, we are left with one preventive measure, that of protecting the drinking water supply from every possible source of contamination with sewage, as the only definite and practical means of preventing amebiasis.

Public fear of amebiasis has resulted in the request of a school board that a teacher resign; or the question being raised whether it was safe to permit a patient to continue working in a store or office, and so on. As has been pointed out, amebiasis is probably spread chiefly by infected water, so that any patient or carrier is a potential source of trouble if his feces find their way into drinking water. For all practical purposes, if sewage disposal facilities preclude the possibility of waste matter getting into the water supply, if a patient is cleanly in his personal habits, and if the sewage system in homes or buildings conforms to the law, there is little or no danger from any patient. In our experience, we do not recall any instance in which, in a family of which one member had amebiasis, another became infested unless both members were originally exposed at the same time. Many individuals who have returned from trips have been found to be infested with Endamoeba histolytica, but others in the family, who remained at home, have not contracted the disease. An unfortunate phase of the publicity concerning the Chicago outbreak led many people to consider a patient with amebiasis much more of a menace to society than was the leper in Biblical times. McCoy now reports no satellite epidemics resulting from cases of amebiasis contracted in Chicago.

Treatment

Two outstanding problems confront the physician in the treatment of amebiasis: 1. Many people, both physicians and patients, have feared that the disease is incurable. 2. The dangers of treatment by emetine and arsenic have been over emphasized to the point that often doses are too small and courses too short to give a possible chance of a cure.

Curability.—Clinicians of great experience, such as Rogers, Craig and James, who have seen the severe manifestations of amebiasis in the tropics, have taught that in these cases it is doubtful if the word "cure" ever should be used. Their constant and unremitting search for effective amebicides has directly and indirectly served to provide the newer and more effective remedies. Although there is no question that Endomoeba histolytica is the same parasite in Saskatchewan as it is in Madras, yet it is reasonable to speculate that the general resistance and health of the white man when he is in the North is probably higher than when he invades the tropics. This may explain why infection may be most serious, yet the incidence of rapidly fatal infections is less in the North than in the tropics. Even in outbreaks of overwhelming infection, one of which was seen a year ago, very few deaths have been reported in cases in which operation was not performed. Certainly experience at The Mayo Clinic has shown an encouragingly higher percentage of apparent cures, as our regimen of treatment has improved. In many of the cases in which the infestation was contracted in Chicago, and in which we have prescribed treatment, public interest had so stimulated the patients that follow-up examinations were not only readily obtained but were requested by the patients. We hesitate to be definite this early, but of those patients of whom we have knowledge, less than 10 per cent have given evidence of persistence of the parasite in the intestine and we feel hopeful that judicious varying of "ammunition" will ultimately result favorably in most of that 10 per cent.

We have found it advantageous to attack first with emetine, administered subcutaneously, and with treparsol administered orally. If there is recurrence, it seems better not to persist with these drugs but to turn to yatren, perhaps in conjunction with large doses of bismuth given orally. In our experience, medicated enemas or irrigations have not seemed of enough value to warrant their routine use. It is true that the older method of treatment in which kerosene enemas were given, in conjunction with emetine, have given good results in some instances. If infestation still persists after a course of yatren (3 gm. daily for a week and repeated after an interval of a week), then administration of emetine and treparsol may be repeated.

Dangers of treatment.—In no wise do we wish to minimize the fact that use both of emetine and of the arsenical preparations entails danger, but respect for this fact permits us to use the two most efficient weapons that we possess to combat this disease; emetine controls the acute manifestations while arsenic is more effective in eradicating the ameba. We are not attempting to make any final statement nor to review reports of such excellent work as has been carried out by Leake and Read, but we wish merely to present our own experiences.

For approximately fifteen years, emetine has been used at the clinic without causing a death. Peripheral neuritis has resulted in only one case, and in that case the patient later recalled that he had received emetine shortly before he came to the clinic. We do not select the patients who are to receive emetine, nor do we hospitalize the patients unless their general condition demands it. Years ago, Logan instituted the regimen of administering 1 grain (0.065 gm.) of emetine hydrochloride (Burroughs-Wellcome) subcutaneously twice daily for three days. This successfully controls acute manifestations of the disease. For children, or for elderly, debilitated patients, the dose is kept to ⅓ or ⅔ of a grain (0.02 or 0.043 gm.) twice daily. After an interval of a week, this course of 4 to 6 grains (0.24 to 0.40 gm.) is repeated. Formerly, we gave a third course after a second interval of two weeks, but now we seldom use more than two courses, for that is adequate to control the active phases. Using a carefully prepared product, giving it subcutaneously, and allowing a period of rest between courses, are the probable reasons for our avoidance of complications with emetine. In addition, the patients are always held under close observation.

The same principles apply to the use of the arsenical preparations. The first orally administered arsenical preparation, stovarsol, proved efficient, but in about 3 per cent of the cases toxic erythema developed, and we encountered two cases of peripheral neuritis in which arsenic persisted in the urine six months after administration of the drug had been discontinued. Treparsol is equally efficient, and also produces toxic reactions in 3 per cent of cases, but it is rapidly eliminated, so that in seven years we have had no cases of peripheral neuritis. We have used treparsol in conjunction with emetine in all proved or suspected cases of hepatic abscess, without untoward results. The dose is 0.25 gm. with each meal for four days; at intervals of ten days, two more such courses are administered. Administration of emetine and arsenic are started at the same time. Our experience with carbarsone is too limited to justify our expressing an opinion concerning it, although it has seemed less efficient in our hands than treparsol. Also, it is eliminated slowly, as is stovarsol, and this slow elimination may result in neuritis. One such case has been reported to us. Because deaths have been reported elsewhere, from the use of either treparsol or stovarsol, we must reëmphasize the necessity of stopping administration of the drug at even a suspicion of intolerance. If toxic phenomena develop, arsenic should never be used again.

It is our impression that both emetine and treparsol can produce reactions, especially the early acute manifestations, on an allergic basis. Certainly, we have used both drugs enough years to eliminate the thought of excess dosage, and we believe that the reaction is the result of drug allergy.

Yatren, which is essentially sodium iodoxyquinoline sulphonate, usually produces increased diarrhea in the recommended dose of 3 gm. daily, and this dose must often be decreased by half. A few instances of jaundice have been reported. Other than these by effects, we know of no difficulties with yatren. Vioform is similar to yatren. We have not used it enough to justify us in expressing an opinion, although our brief experience with it is that it is less effective than yatren.

Probably one could summarize the question of danger by stating that emetine and arsenic are poisons; with proper dosage and supervised courses, the danger is minimal, and, in those cases in which reactions do occur, they may be more on a basis of drug allergy than on one of actual overdosage. It is wise to inquire concerning any known personal or familial allergic phenomena, and to be especially watchful in cases in which the history is positive.

Summary

Amebiasis is a world-wide disease, with an average incidence in the United States of from about 5 to 10 per cent, according to geographical situation. Absolute diagnosis rests on identification of the parasite in stools or in the discharge from sinuses. The disease is transmitted from host to host by transference of cysts. The cyst is killed rapidly by drying or heating but lives long in water, even though the water is chlorinated. The microörganisms are not as commonly distributed by food-handlers or on raw vegetables as formerly was believed.

Conformity to regulations about cross connections between water supplies and sewage systems is essential to control amebiasis. Suitable and varied treatment results in apparent cures in a high percentage of cases encountered in the north temperate zone. Although emetine and treparsol are definite poisons, careful and supervised use of them constitute the most satisfactory treatment with which we are familiar. Carriers, as well as persons who have active amebiasis, can transmit the causative organism. However, as has been indicated, if such persons take care with personal cleanliness, and if sanitary regulations are followed in their communities, the menace which they constitute is less than that offered by carriers of, or by persons who are actively ill with, most other infectious diseases.

TREATMENT OF HEAD INJURIES*

ROBERT EARL, M.D., F.A.C.S.
Saint Paul

IN head injuries, it cannot be too often emphasized that it is the damage to the brain and its blood vessels and not the fracture of the skull which determines the seriousness of the case.

Brain injuries resulting from trauma are classified as concussion, contusion, laceration, edema and compression from hemorrhage. Any or all may be present in any one case. Each must be treated individually according to the findings and indications present.

A short period of unconsciousness is a favorable sign regardless of the apparent severity of the head injury. When coma is deepening, it is evidence that the patient is growing worse. The longer unconsciousness lasts, the more guarded must be the prognosis for ultimate or complete recovery. Because the brain is enclosed in a bony cavity incapable of expansion, the pressure resulting from hemorrhage and edema causes serious damage and sometimes death. In critical cases the patient's pulse, respiration, temperature and blood pressure should be taken and recorded every thirty minutes during the first twenty-four hours or more. If any significant changes occur, the attending physician should be immediately notified in order that he may institute treatment to counteract the increasing intracranial pressure before it is too late.

Following head injuries, pallor, sweating, a rapid, thready pulse, dilated pupils, low blood pressure and subnormal temperature, we know indicate shock. Shock, in head injuries, may be greatly aggravated by trauma to the limbs or abdomen and by the loss of blood from lacerations of the head or elsewhere. Our first attention should be directed toward arrest of bleeding from any external lacerations. The treatment of shock should be started at the earliest possible moment. Heat should be applied and cardiac stimulants given. Caffeine sodium benzoate is an excellent stimulant and has the added advantage of reducing the intracranial pressure. Dr. Donald Munro of Boston and others advocate giving from 50 to 100 c.c. of a 50 per cent solution of glucose intravenously at intervals of three hours if needed. The hypertonic glucose solution recalls into the blood stream the blood serum which has leaked into the tissues because of shock. The same osmotic flow that recalls the serum lost in the tissue fluids and corrects shock also reduces the edema in the brain. Blood transfusions should be given as early as possible when needed.

Examine and record the presence or absence of all normal and pathological reflexes. Compare the two sides of the body to see if there is muscle weakness or paralysis in any part of the body. The detection of partial hemiplegia is often possible in unconscious patients through observation of the movements of the extremities during restless periods or the movements caused by irritating stimulation. If there is early paralysis, it usually means cortical laceration in the motor area and should be distinguished from paralysis appearing later which is probably due to increasing local hemorrhage.

---

*Read before the Ramsey County Medical Society, November 26, 1934.

Get all the history possible as to whether or not there was a short or long period of unconsciousness immediately after the injury, also keep in mind that a patient may have become unconscious from some condition as apoplexy, uremia, acidosis, etc. While unconscious, he may have fallen off a ladder or down stairs, or his uncontrolled automobile may have crashed, giving all the evidence of an ordinary accident, whereas the patient's unconsciousness may be due to a diabetic coma or apoplexy, upon which a head trauma has been superimposed.

Semiconscious patients are sensitive to and annoyed by noises, so they should be placed in a quiet room by themselves. Restlessness and irrational acts are probably caused by severe headache. If put in restraints and immobilized, they will fight. Have canvas or other protection placed on the sides of the bed so they cannot fall out but can move their limbs. They are best comforted and given necessary restraint by an intelligent special nurse. An ice cap on the head is a comfort to the patient and to those friends who insist that everything be done. The patient should be kept quiet and have no visitors. Never give morphine under any circumstances as it is a respiratory depressant and it may stop respiration, even when given in small doses. Morphine masks pupillary reactions and other symptoms.

Phenobarbital subcutaneously acts well to control undue restlessness. Lumbar spinal drainage, by reducing intracranial pressure, relieves headache. Blood in the spinal fluid indicates that there has been hemorrhage into the subarachnoid space. Withdrawal of as much of this blood as possible will diminish the irritation caused by it and reduce the amount of adhesions formed between the pia and arachnoid. These adhesions interfere with the circulation of the cerebrospinal fluid, causing post-traumatic headaches and dizziness. The cerebro-spinal pressure should always be taken with a manometer as this is the only way of accurately judging the pressure. If a mercury manometer is used, the normal pressure should be about 10. If the pressure is above this, enough fluid should be withdrawn to bring the pressure down to 10 unless the pressure is unusually high (30 or over), in which case the pressure should be reduced to about one-half the initial pressure. Spinal drainage may be repeated at intervals of three to twenty-four hours as indicated by the symptoms. Novocaine should be used to avoid irritating the patient. When the spinal needle is introduced, cerebrospinal fluid should be withdrawn slowly as the rapid withdrawal of large amounts may tend to encourage bleeding in the early stages. There is also some danger that the medulla may be pressed into the foramen magnum, causing inhibition of respiration.

The intracranial pressure may be reduced for about three hours by dehydration with 50 to 100 c.c. of a 50 per cent solution of glucose given intravenously. If given in larger doses, there may be a secondary rise of pressure.

At the laboratory of physiology at the Harvard Medical School, it has been demonstrated experimentally in dogs that the administration of 3-8 grams per kilo of a 50 per cent solution of sucrose will reduce the cerebrospinal pressure without a secondary rise.*

The most efficient drug for reducing the intracranial pressure by dehydration is magnesium sulphate given as a retention enema. From two to four ounces of the saturated solution should be given slowly by gravity through a soft number 10 French catheter. Repeat the enemas every three hours for four doses, then wait twelve hours before starting them again or the patient may develop a toxic dehydration with subnormal intracranial pressure. Magnesium sulphate can be given by mouth but it often causes vomiting. If a patient cannot retain magnesium sulphate by mouth or rectum, it can be given as a 2 per cent solution intravenously. Never dehydrate with intravenous hypertonic salt solution. It dehydrates rapidly but there is a secondary rise of the intracranial pressure to a higher level than before the solution was given.

Restriction of fluids is essential while acute symptoms are present and for a time after they have subsided, but in the most extreme cases they should not be reduced below 500 c.c. in twenty-four hours.

---

*Since this article was written, Lilly and Co. have marketed a 50 per cent solution of sucrose in 100 c.c. glass ampules which we are now using instead of glucose.

There is considerable controversy as to the use of spinal drainage and the intravenous use of hypertonic solutions of glucose to reduce intracranial pressure. I believe that the majority of clinics treating large numbers of traumatic head injuries use the following methods in selected cases: (1) spinal drainage; (2) intravenous glucose; (3) magnesium sulphate rectally, orally or intravenously; (4) restriction of fluid intake.

The taking of x-ray pictures should be deferred until the patient has recovered from shock. Good x-ray pictures cannot be taken when the patient is restless and resistive. Stereoscopic pictures should always be taken with a technic which will give good black and white contrast. Fractures will show better in black and white films than in gray films. Expert x-ray interpretation is essential.

When dilatation and fixation of both pupils are present, an unfavorable prognosis should be given. A choked disk usually does not appear until twenty-four to forty-eight hours after injury, which is too late to be of diagnostic value in the early stages. When one pupil only is dilated, it is a suggestive, but not a positive sign that the greatest damage has been done on that side.

A pulse in the sixties should be closely watched. In the fifties, it is a definite indication of a high intracranial pressure. If it goes down into the forties, it should arouse grave apprehensions. When a pulse which has been slow starts to go up gradually, it is a favorable sign, but if it goes up rapidly and especially if the temperature also goes up, the patient will probably die from edema of the medulla with respiratory failure. A temperature which at first is subnormal but which rises to normal or above is a favorable sign. Continued subnormal temperature indicates continued shock and is a grave prognostic sign. A rapidly rising temperature to 105 or 106 degrees indicates impending death. A temperature of 102 degrees or less is favorable. A low blood pressure indicates shock, a high blood pressure or a high pulse pressure indicates a high intracranial pressure. A slow respiration of fifteen or under indicates a high intracranial pressure. In the terminal stages of fatal head injuries, we have the syndrome of loss of consciousness, rapidly rising pulse and temperature with rapid, shallow and irregular respiration.

A left sided temporal injury with speech disturbance is an important localizing sign which is sometimes overlooked when a patient is recovering from stupor or coma. The patient may look as if he understood but does not reply because of his inability to speak. If a fracture involves the middle or inner ear, we may have escape of blood or cerebrospinal fluid through the external auditory canal. The canal should never be irrigated because this may force infection into the brain through the fracture opening. The canal should not be packed. The entire injured ear should be covered and turned down on the pillow to encourage drainage.

Loss of the sense of smell is a localizing sign for frontal lobe injury or tearing of the olfactory nerve filaments. In a fracture across the sinuses and ethmoidal cells with rupture of the dura and arachnoid, there will be dripping of blood and cerebrospinal fluid from the nose. In such a case, effort should be directed toward reducing the intracranial pressure in the hope that a clot or exudate may seal the opening. The nasal cavity should never be irrigated and the patient should not be allowed to blow his nose for fear of forcing air and infected secretions into the cranial cavity.

In compound fractures of the skull, stop the hemorrhage first. If the patient is in shock, apply a sterile dressing and treat the shock. If the patient cannot survive the shock, he will have still less chance of recovery if the trauma and hemorrhage of an operation are added. After the patient has recovered from shock, has been grouped for possibly needed transfusion, and the operative conditions made ideal, the parts should be shaved, cleaned with ether, and antiseptics applied. Under local anesthesia the wound should then be debrided by incising through normal tissue down to the bone.

Depressed fractures over the longitudinal or lateral sinuses may be plugging a laceration in the sinus. If the plugging bone fragment is removed, a severe hemorrhage may result. Detached or depressed pieces of the skull can best be managed by trephining an opening in the normal bone adjacent to the fracture line and removing enough of the normal bone so the fractured pieces can be removed without further injury to the brain or its coverings. Detached or depressed fractures in the frontoparietal regions should be carefully cleaned, elevated and readjusted. If osteomyelitis does not develop, the resulting protective, psychologic and cosmetic values will be real accomplishments. Slightly depressed fractures without focal symptoms and especially when not over the motor areas may be treated conservatively. When the dura is lacerated, debride it. If there is a blood clot, suck it out, using a small sized glass drinking tube attached to a suction apparatus. Be sure to suck out all dead tissue, blood and debris. This will cause more bleeding at first but it will gradually stop. At last there will be only one or two bleeding points which can be controlled by electro-coagulation, silver clips or muscle graft transplants. Complete hemostasis is essential as no drainage should be used. Draining the ventricles will help to stop troublesome, venous bleeding by permitting collapse of the brain.

Any portion of the brain left uncovered by dura may be covered by a fascia lata transplant or a piece of Cargile membrane. The scalp can be approximated easier over the vertex by tripod plastic incisions and flaps than by right angled flaps. If there is a bony defect, it must be covered with good scalp even if a flap must be turned to cover it. Use two layers of fine interrupted silk sutures, one in the galea and the other in the skin. After the sutures have been tied, scarify the flaps near the suture line down to, but not through, the galea. This will permit the escape of serum, prevent edema, and give a higher percentage of primary union. In compound fractures of the skull, spinal drainage may create a negative pressure and draw infected material through the dural tear, causing meningitis. Some give urotropin, believing it acts as an intracranial antiseptic.

Extradural and subdural hemorrhages must be diagnosed early, for in the great majority of cases, operation offers the only chance of recovery. They are usually caused by fractures of the temporal bone and may be on the side opposite the point of impact. Of all traumatic conditions causing increased intracranial pressure, extradural hemorrhage from the middle meningeal artery is the most important. As the hematoma enlarges, it strips the dura from the skull, causing gradually increasing compression of the brain. When the main trunk or a large branch of the middle meningeal artery is torn, the hemorrhage may be so rapid that it may cause death in two hours or less. The bleeding from a smaller branch may be so slow that it may require several days for the clot to become large enough to jeopardize the patient's life. When a patient sustains a head injury, is unconscious for a short time, regains consciousness, then becomes progressively more drowsy and finally comatose, we must consider a gradually increasing hematoma. The clear interval varies in duration from a few minutes to several hours or days, depending on the rapidity of the hemorrhage and duration of the concussion. An x-ray finding of fracture in either temporal areas or the base would help to confirm the probable correctness of this diagnosis. As the hematoma gradually increases from the temporal region upward, it involves first the face, as evidenced by some lagging of the muscles of the opposite side. Next there will develop a weakness in the opposite hand and arm. Later the leg becomes weak, a Babinski may be present, and the pupil may dilate on the same side as the hematoma.

When we have a progressively increasing paralysis with signs of increasing intracranial pressure such as headache, restlessness, vomiting, increasing coma, loss of sphincteric control, slow pulse and respiration, we have a perfect picture of extradural or subdural hematoma calling for immediate, proper surgery. Should there be any doubt as to the presence of extradural or subdural hemorrhage from the clinical signs and symptoms when the patient's condition is serious, an exploratory opening should be made through the skull in the temporal region on the suspected side. The entire head should be shaved and prepared so if no blood is found on the first side explored, the opposite side can be explored without delay. If no extradural blood is found, the dura should be opened, when a considerable amount of cerebro-spinal fluid or blood may escape. A soft rubber drain through the subtemporal opening will serve as a splendid decompressing measure. If no blood is found extra- or subdurally, an exploring cannula may be introduced into the substance of the brain for the purpose of locating and draining a possible subcortical collection of blood.

All patients, whether operated upon or not, who have sustained head injuries severe enough to have rendered them unconscious for one hour or more should be confined to bed for two weeks after their cerebro-spinal pressure has been normal as shown by the manometer on two successive days. This arbitrary period of two weeks' rest is required to give the delicate physiological balance of the cerebro-spinal system time to re-establish itself. After the two weeks' rest period, the patients may sit up and be about as much as they feel able. They should not be allowed to go home until they have become sufficiently strong to walk up two flights of stairs. This will help them combat the psychology of having friends come and tell them they have known of people who have become insane, who have continuous headaches, and have been unable to work after similar accidents. If these patients are given too much sympathy and attention they are likely to become chronic invalids. These patients should be encouraged to gradually resume their activities as soon as possible.

DYSMENORRHEA*

L. W. BARRY, M.D.

Saint Paul

DYSMENORRHEA is not a disease. It is in reality only a symptom of some underlying pelvic or constitutional disturbance. Two types of dysmenorrhea are recognized: (1) the primary or essential; and (2) the secondary or acquired. The primary type occurs without demonstrable pathology while the secondary or acquired type may be caused by ovarian tumors, uterine myomas, endometriosis, uterine displacements or other pelvic lesions.

Frequency.—In 1877, Mary Jacobi[18] found that 46 per cent of women complained of menstrual pain. In 1913, in a study of 100 women by a questionnaire, Chisholm[4] found that 77 per cent suffered some pain during their periods. However, the pain was incapacitating in only 3 per cent of the cases. Margaret Sturgis[32] in 1923 in an investigation of the menstrual history of 2,077 employed women, reported 14.7 per cent as having pain with their periods. However, only 2.2 per cent were incapacitated. Elizabeth Van Duyne[33] observed 3,077 women at Goucher College from 1900 to 1907. She found dysmenorrhea in 7.1 per cent, which was later reduced to 3 per cent by a more general and systematic physical training. Norman Miller[23] studied 785 college women and nurses in 1930. Forty-seven per cent complained of menstrual pain; however, only 17 per cent were severely handicapped.

Etiology.—We are still very much in the dark as to the exact etiology of primary or essential dysmenorrhea. A maze of theories has been advanced in explanation of the causation of the severe pain. The pain is quite similar to that occurring in gallstone or ureteral stone colic; in fact, it is typical smooth muscle pain.

For years the pain in dysmenorrhea was believed to be caused by an obstruction or congenital stenosis of the cervix, which prevented the free exit of the menstrual blood from the interior of the uterus. Mackintosh[20] advanced this theory in 1832; his cause was warmly championed by James Y. Simpson and J. Marion Sims.

W. Blair Bell[2] and others regard an acute anteflexion of the uterus as the chief causative factor in the production of dysmenorrhea. Herman[16] denies that anteflexion is a cause. C. Jeff Miller[22] has this to say of anteflexion:

> "Anteflexion of the uterus is associated with dysmenorrhea sufficiently often to make it seem that there is some specific relationship between the two conditions. All anteflexions, it is true, are not accompanied by dysmenorrhea, and both types of pathology are so frequent that the coincidental occurrence, at least in a certain percentage of cases, can be explained by the law of averages; but the fact remains that the association is very frequent and that anteflexion undoubtedly is the explanation of some cases, at least. Retrocession is often present with the anteflexion, and the whole uterine musculature is markedly relaxed. Endometrial hypertrophy is a frequent though not a constant finding, and associated sterility is quite general. There is often evident a distinct cicatricial band at the internal os, though actual stenosis, as has already

---

*Read before the Southern Minnesota Medical Association, Faribault, Minnesota, August 24, 1934.

been noted, cannot be demonstrated. Moderate degrees of hypoplasia are frequent in association with a long, conical cervix, the whole organ assuming the appearance of the letter J, and other developmental errors of the supporting structures of the kidney or colon are often evident also. The hypoplasia, according to Graves, may be considered secondary to the malposition, which develops at puberty, as the result of some tissue defect, and retards the full growth of the uterus by a partial interference with the blood supply."

Hypoplasia.—A defective development of the pelvic organs is frequently observed in dysmenorrhea. The uterus is infantile in type; the cervix represents three-fifths of the total uterine length. Sterility is common in this class of cases. In fact, the infantile uterus, dysmenorrhea and sterility is a common gynecological triad.

The pain occurring in the infantile uterus has been explained: (1) by obstruction, due to the cervical stenosis; (2) by the uterine cavity being too small to accommodate itself to the menstrual swelling of the endometrium, which acts as a foreign body. Attempts of the uterus to expel its own lining results in the colicky pain so characteristic of dysmenorrhea.

Schultz[31] considers the pain in the hypoplastic uterus as due to the failure of the myometrium to empty the uterine veins during the physiological hyperemia accompanying menstruation. This results in a venous stasis with pressure on the uterine nerves.

Döderlein[9] considered a hyperesthesia of the uterine mucosa a basis for many cases of dysmenorrhea.

Dysmenorrhea may, at times, be distinctly neurotic in origin, which may be the fault of poor heredity, or the patient may be the victim of suggestion from a too solicitous mother, by whom she is informed that pain during the periods is to be expected. She is put to bed with a hot water bottle and given a drink of brandy to await the arrival of the menstrual pains, which, if she be an impressionable type, are almost certain to materialize. Menge[21] considers dysmenorrhea merely an exaggeration of the normal physiologic uterine contractions, which cause no pain in women of sound nervous temperaments. J. Novak and Harnik[27] believe that all cases of essential dysmenorrhea are neurotic in origin and that careful investigation will reveal that some psychic trauma, many times sexual in nature, is the basis of the first attack. The recurrence of subsequent monthly attacks is a result of the anxiety and fear thus subconsciously associated with the menstrual function. Cure may be accomplished by gaining the confidence of the patient and making her realize that her monthly attacks of pain result from a state of her subconscious reflexes rather than any disease of the pelvic organs. They report 168 cases treated by psychic reeducation. Seventy-one were completely cured and eighty-nine markedly improved.

Hormonal Theory.—Dysmenorrhea may at times be encountered in patients with definite endocrine disorders. Usually this is not the case. Administration of thyroid, pituitary, ovarian and mammary extracts have only too often ended in miserable failure. However, recent investigation by Novak and Reynolds[26] promises to throw considerable light upon the hormonal origin of primary dysmenorrhea. By experiments on rabbits' uteri they have shown that folliculin or theelin is responsible for uterine motility. Experiments with other endocrine preparations demonstrated that theelin alone possessed the property of stimulating uterine muscle contractions. It was also found that the injection of the urine of pregnant women as well as progestin inhibited uterine motility. As a result of their experiments these authors agree that whatever the underlying cause of primary dysmenorrhea may be, the immediate cause is a spasmodic contraction of uterine muscle. These contractions are in turn the result of the withdrawal of corpus luteum (progestin) activity with an ascendency of theelin or folliculin, which according to Frank[15] reaches its greatest concentration in the blood stream during the premenstrual and early menstrual phase.

A form of dysmenorrhea of special interest is the so-called nasal dysmenorrhea first described by Fliess[12] in 1893. Fliess described genital spots in the nose consisting of erectile tissue situated on the anterior end of the inferior turbinate and on the tubercle of the nasal septum. According to Fliess these spots become swollen, congested and hypersensitive during menstruation. He distinguished two types of dysmenorrhea, one in which the pain disappeared with the appearance of the menstrual flow, the other in which the pain continued. The first type, he believed due to cervical stenosis; the second type included numerous patients in whom cocainization of the genital spots caused immediate cessation of the menstrual pain. Permanent relief from nasal dysmenorrhea was often possible by cauterizing the genital spots by galvano cautery, electrolysis or trichloracetic acid. Schiff[30] later confirmed Fliess's observations and stated that 72 per cent of all types of dysmenorrhea yielded to this treatment.

Treatment.—The treatment of secondary or acquired dysmenorrhea requires very little comment. Its cure is effected by removing or correcting the cause. The treatment of essential or primary dysmenorrhea is quite unsatisfactory and will remain more or less empirical until the causes of this type are more fully investigated. We are all agreed that a full-term pregnancy effects a physiological cure in the great majority of cases. Unfortunately dysmenorrhea develops in girls too young to consider marriage and pregnancy. Although marriage may be recommended, not all dysmenorrhea victims are sufficiently beautiful or wealthy to obtain a husband at will.

Fortunately only from 2 to 3 per cent of the women are totally incapacitated by the menstrual pain. In this small percentage of cases the pain, however, is very severe. Relief is demanded from their physician and obtained usually in the form of morphine, gr. ⅛ to ¼ hypodermically. This is a dangerous drug to use, leading in many instances to drug addiction. Litzenberg[19] at the recommendation of Macht, has employed a 20 per cent emulsion of benzyl benzoate in 2 drachm doses every four hours. Success was obtainable in 62.7 per cent of the cases reported. Antipyrine grs. iii and aspirin grs. X every four hours, also sodium amytal in 1½ to 3 grain doses every six hours, have given the writer excellent results. Bromides in appropriate doses succeed at times, especially in the neurotic patient, after all other measures have failed to give relief. Novak[24] obtained excellent results with 1/100 grain atropine by mouth every six hours. Since nausea and vomiting are quite frequent in dysmenorrhea, it may be necessary to administer the medication by rectum. The writer has obtained gratifying results with 1/32 to 1/16 grain dilaudid rectal suppositories every six to eight hours. Authorities claim the drug is not habit-forming. In 1910 Drenkhahn[10] reported good results in the control of menstrual pain by the injection of 1 mg. of atropin dissolved in 1 c.c. of sterile water directly into the cervical canal.

Many cases of dysmenorrhea are helped markedly by better hygiene. Norman Miller reports a marked lessening of the number of cases of dysmenorrhea in college girls and nurses through improvement in posture and muscle tonus through proper exercises. Careful regulation of the bowels is important from three days to a week before the onset of the period. Change in occupation is at times beneficial. Someone has facetiously remarked that the rich woman should be put to work and the poor working girl should be sent to the seashore. For the temporary relief of dysmenorrhea Novak[25] recommends the intramuscular injection of 100 rat units of Parke, Davis and Company Antuitrin S, one to two days before menstruation, which may be repeated in one to two days, depending upon the severity of the dysmenorrhea. For permanent relief he recommends the hypodermic administration of 50 rat units of theelin on alternate days for six days, beginning the injections one day after the finish of the menstrual period.

X-ray Irradiation.—Drips[11] and Ford[14] recommend irradiation of the ovaries and hypophysis for dysmenorrhea. The dosage is 5 per cent of an erythema dose of well-filtered rays produced by high potentials applied at the depth of the ovary or pituitary gland. Ford[14] in a series of twenty-nine cases reports relief in eighteen. The good results were attributed to the selective destruction of unhealthy or atretic ovarian follicles.

Dilatation of the cervix has always been a popular method for the relief of dysmenorrhea. Thousands of cervices are dilated every year. The relief obtained, however, is usually only temporary, rarely lasting more than six months. Dilatation of the cervix was first carried out in the United States by Dewees in 1826.[8] C. Jeff Miller[22] has the following to say of cervical dilatation:

> "In the line of operative treatment, however much we may decry the procedure, dilatation, with or without curettage, still remains the commonest form of

treatment and probably gives the highest percentage of temporary and permanent cures. Whether the pain is due to a spasmodic contraction of the circular fibers at the internal os, to an undue amount of connective tissue at this point, or to another and entirely extrapelvic cause we have no way of determining, and it must be granted that the employment of a method which is strictly local for correction of a condition which may or may not be local in origin is entirely illogical and empiric. On the other hand, common sense must be invoked; what our patients are after, as Howard Kelly wisely remarks, is relief with or without a sound theory behind the method by which it is secured, and we have no right to quarrel with any measure, however irrational and illogical it may be, which achieves results. Dilatation and curettage in my hands has yielded decidedly better results than any other method I have employed, approximately 40 per cent of permanent cures, to which must be added at least 30 per cent of partial or temporary cures.

"The gynecologist who bases his objections to this procedure on strictly academic grounds forgets that even temporary relief from dysmenorrhea is usually very gratefully received by the woman who suffers from it. More than one patient has told me that the months of relief thus afforded her have enabled her to get her physical and nervous balance, so to speak, so that when the dysmenorrhea recurred—and the recurrence is frequently of a less severe type—the monthly ordeal was by no means so trying. This is a very important consideration. It is easy to conceive, as has already been pointed out, that with the constant recurrence of pain, which is often very severe if not actually disabling, nervous exhaustion is likely to follow, and that, as time goes on, the effect of each period will last longer and the reaction from it will be less prompt, so that eventually a constant nervous irritation is maintained and the patient becomes thoroughly neurotic, though it would be most unfair to say that her neurosis is primary. For my own part, I do not believe that even a definite neurasthenia contraindicates the performance of dilatation and curettage, provided that the pain is of the typical type and that the pelvic findings furnish the proper indication.

"The operation should be done only in the cases in which the uterus is of the typical anteflexed, hypoplastic type and in which there is no other pelvic pathology such as retroflexion, tumors or inflammatory disease to explain the menstrual pain."

Carstens[3] recommends the introduction of a silver Chamber's spring stem pessary into the cervix following dilatation. He claims a marked development of the hypoplastic type of uterus through constant uterine contractions caused by the spring pessary. The writer has used the Chamber's spring pessary in several cases with excellent results, but fear of infection has caused him to discontinue its use.

Menge[21] recommends dilatation of the cervix with a longitudinal section of the internal os with a bistoury. Celand[5] describes a similar procedure using a bistoury knife to make longitudinal incisions in the internal sphincter of the os 1/12 to 1/16 inch deep after a preliminary dilatation of the cervix. After the two lateral incisions are made the cervix is again dilated up to a number 15 Hegar dilator. The uterine cavity and the cervix are then firmly packed with iodoform gauze, which is removed at the end of ten days. He reports less than 5 per cent failures in 230 cases. The writer has used this operation a number of times with marked success. Instead of using but two lateral incisions the writer makes multiple longitudinal incisions through the internal sphincter and leaves the iodoform packing in the uterus but five days because several of the patients had a rise of temperature after this time. Danger of infection is minimized if the uterine cavity is not curetted.

Dudley's operation consists in cutting the cervix posteriorly up to the level of the internal os. The lower edges of the incision are sutured to the upper end of the incision. Pozzi[28] recommends incising the cervix bilaterally up to the level of the internal os. W. Blair Bell[2] describes an operation in which he dissects the bladder from the cervix anteriorly; then dilates the cervical canal and splits the cervix in front, carrying the incision well up into the uterine cavity. The superficial longitudinal fibers of the uterus are sutured over the incised cervical canal, thus leaving the deeper portion of the incision unsutured. The bladder and the vaginal mucosa are then sutured to their original position.

Section of the Presacral Nerve.—In 1898 Jaboulay[17] attempted to relieve pelvic pain by interrupting the afferent paths in the sacral sympathetic chains. In 1899 Ruggi[29] published his interesting work on abdominal sympathectomy in functional disturbances of the female organs. In 1925 Cotte[6] sectioned the superior hypogastric plexus (presacral nerve of Latarjet) for pain in cases of functional dysmenorrhea. In 1929 he reported 200 cases with excellent results. In 1930 Fontaine[13] and Herrmann reported twenty-two cases of section of the presacral nerve. DeCourcy[7] .of Cincinnati reports a series of twenty-one cases in which he sectioned the presacral nerve for dysmenorrha with excellent results. Adson and Masson[1] of the Mayo Clinic in 1931 report six cases of resection of the presacral nerve for dysmenorrhea with favorable results. DeCourcy[7] describes the operation as follows:

"The patient being anesthetized and placed upon the table, the cervix is dilated. She is then placed in the Trendelenburg position, and a left rectus incision made close to the midline, extending from the pubic bone to a point about one inch above the umbilicus. Packing is placed to keep the intestines upward, but the sigmoid is retracted to the left. The uterus and ovaries should be inspected, and if any pathologic conditions, such as cysts or retroversion, are in evidence, correction is undertaken before proceeding with the nerve section.

"Usually, as soon as the promontory of the sacrum is uncovered, it is possible to see the fibers of the presacral nerve crossing the left iliac vein. The posterior parietal peritoneum is next opened by an incision bisecting the pelvic triangle which lies between the right iliac artery and the left iliac vein. All the fibers in this triangle are picked up upon a ligature carrier or other suitable implement, and entirely stripped away, care being exercised not to omit any fiber, however insignificant. There is little or no bleeding, but any points which are evident should be ligated. The peritoneum is then closed. It is my routine practice to remove the appendix, if present, after which the abdomen is sutured in the usual manner.

Postoperative Results

"The immediate results of this procedure have been excellent, and in no instance has the pain failed of relief. Menstruation regularly takes place within forty-eight to seventy-two hours after operation, no matter what time in the menstrual cycle it has been performed. Most of the patients have had to be catheterized for two or three days, but the inhibition of bladder function has been no more marked than after any other gynecologic operation. Cotte claims that in the majority of his cases, which at the latest reports numbered over a hundred, micturition was easier and the output of urine greater than is usual after any sort of pelvic procedure. None of my patients have had any difficulty with the bladder afterward, although the possibility of some interference with vesical function has always been kept in mind. Several of my patients have since become pregnant, demonstrating that there is no interference with childbearing."

In the writer's opinion this operation, in spite of its enthusiastic reception, should be reserved for those cases of intractable dysmenorrhea where all other remedial measures have failed.

Summary

1. Two types of dysmenorrhea are recognized: the primary or essential, which occurs without demonstrable pathology, and the secondary or acquired type, which may be caused by ovarian tumors, uterine myomas, endometriosis, uterine displacements or other pelvic lesions.

2. According to different investigators the frequency of pain during menstruation varies from 7.1 to 77 per cent; the number severely handicapped by the pain varies from 2.2 to 17 per cent.

3. The etiology of primary or essential dysmenorrhea has not been satisfactorily determined.

4. Some of the causes advanced in explanation of dysmenorrhea are: stenosis of the cervix, acute anteflexion of the uterus, hypoplasia of the uterus, neurosis, and disturbances of the endocrine glands.

5. Recent investigations of Novak and Reynolds tend to support a hormonal origin of primary dysmenorrhea.

6. A form of dysmenorrhea of special interest is the so-called nasal dysmenorrhea first described by Fliess.

7. Treatment of primary dysmenorrhea will remain unsatisfactory until the cause is definitely determined.

8. Antituitrin S (Parke, Davis and Company) for temporary relief of pain and the administration of theelin for permanent relief seems at present to be the most logical medical treatment.

9. Irradiation of the ovaries and hypophysis with small doses of x-ray have given excellent results in the treatment of dysmenorrhea.

10. Dilatation of the cervix according to the technic of Cleland seems to offer the greatest percentage of permanent cures by means of a minor operation.

11. The intra-uterine stem and glass pessaries are dangerous remedies. They invite infection.

12. In case of a failure of simple surgical measures, section of the presacral nerve (superior hypogastric plexus) according to the technic of Cotte is recommended.

References

1. Adson, A. W., and Masson, J. C.: Dysmenorrhea relieved by resection of presacral sympathetic nerves. Jour. Am. Med. Assn., 102:486-490, 1934.
2. Bell, W. Blair: Intrinsic dysmenorrhea. Jour. Obst. and Gyn. Brit. Emp., 30:119-161, 1923.
3. Carstens, H. H.: Amenorrhea, dysmenorrhea, sterility and endometritis as a rule relieved by a silver stem pessary. Med. and Surg., 1:617-623, 1917.
4. Chisholm, Catherine: Menstrual molimina. Jour. Obst. and Gyn. Brit. Emp., 23:288-299, 1913.
5. Cleland, Frederick A.: A method of treatment of severe types of dysmenorrhea with a report of results in 230 cases. Am. Jour. Obst. and Gyn., 8:337-345, 1924.
6. Cotte, G.: La sympathectomie hypogastrique. A-t-elle sa place dans la thérapeutique gynécologique? Presse méd., 33:98-99, 1925; Sur le traitement des dyménorrhées rebelles par la sympathectomie hypogastrique péri-arteriélle ou la section du nerf présacré. Lyon méd., 135:153-159, 1925; Section des ligaments utéro-sacrés et résection du nerf présacré dans le traitement des plexalgies hypogastriques. Lyon méd., 144-549-560, 1929.
7. DeCourcy, J. L.: Resection of the presacral nerve for dysmenorrhea. Am. Jour. Surg., n.s. 23:408-412, 1934.
8. Dewees: Textbook on females. Quoted by Frederick A. Cleland.
9. Döderlein, Theo. J.: Dysmenorrhea essentialis. Surg., Gyn. and Obst., 19:165-168, 1914.
10. Drenkhahn: Die Behandlung der Dysmenorrhœ. Zentralb. f. Gyn., 34:1531-1532, 1910.
11. Drips, D. G., and Ford, F. A.: Irradiation of the ovaries and hypophysis in disturbances of menstruation. Jour. Am. Med. Assn., 91:1358-1364, 1928.
12. Fliess, Wilhelm: Beziehungen zwischen Nase und weiblichen Geschlechtsorganen. Leipsic, 1897.
13. Fontaine, R. and Herrmann, L. G.: Clinical and experimental basis for surgery of the pelvic sympathetic nerves in gynecology. Surg., Gyn. and Obst., 54:133-163, 1932.
14. Ford, F. A.: Roentgen-ray treatment in cases of dysmenorrhea. Med. Woman's Jour., 37:150-153, 1930.
15. Frank, R. T.: The female sex hormone. Springfield, Ill., Charles C. Thomas, 1929.
16. Herman, G. Ernest: An address on dysmenorrhea. Brit. Med. Jour., 1:937-940, 1909.
17. Jaboulay, M.: Le traitement de la névralgie pelvienne par la paralysie du sympathique sacré. Lyon. méd., 90:102-104, 1899.
18. Jacobi, Mary P.: The question of rest for women during menstruation. C. P. Putnam's Sons, 1877.
19. Litzenberg, J. C.: Use of benzyl benzoate in dysmenorrhea. Jour. Am. Med. Assn., 73:601-603, 1919.
20. Mackintosh. Quoted by Novak, E.: Menstruation and its disorders. New York: D. Appleton and Co., 1931, p. 192.
21. Menge, C., and Opitz, E.: Handbuch der Frauenheilkunde. München: J. F. Bergman, 1930.
22. Miller, C. Jeff: In Curtis, Obstetrics and Gynecology. v. 3. Philadelphia, W. B. Saunders Co., 1933.
23. Miller, Norman F.: Additional light on the dysmenorrhea problem. Jour. Am. Med. Assn., 95:1796-1803, 1930.
24. Novak, E.: The atropin treatment of dysmenorrhea. Jour. Am. Med. Assn., 64:120-122, 1915.
25. Novak, E.: The treatment of primary dysmenorrhea. With special reference to organotherapy. Amer. Jour. Med. Sc., 185:237-243, 1933.
26. Novak, Emil, and Reynolds, Samuel R. M.: The cause of primary dysmenorrhea. Jour. Am. Med. Assn., 99:1466-1472, 1932.
27. Novak, J., and Harnik, M.: Die psychogene Entstehung der Menstrualkolik und deren Behandlung. Ztschr. f. Geburts. u. Gynäk., 96:239-296, 1929.
28. Pozzi, Professor S.: On the surgical treatment of a most frequent cause of dysmenorrhea and sterility in women. Surg., Gyn. and Obst., 9:111-117, 1909.
29. Ruggi, G.: La simpatectomia abdominale utero-ovarica come mezzo di cura di alcune lesioni interne negli organi genitali della donna. Bologna: N. Zanichelli, 1899.
30. Schiff, Arthur: Ueber die Beziehung zwischen Nase und wieblichen Sexualorganen. Wiener klin. Wchnschr., 14:57-65, 1901.
31. Schultz, V.: Ein Beitrag zur Aetiologie und Pathogenese der Dysmenorrhœ. Monatschr. f. Geburts. u. Gynäk., 18:854-873, 1903.
32. Sturgis, Margaret: Dysmenorrhea occurring in women employed in large department stores. Jour. Industrial Hygiene, 5:53-56, 1923.
33. Van Duyne, Elizabeth: Some observations on dysmenorrhea at Goucher College. Amer. Jour. Obst. and Gyn., 9:234-239, 1925.

NON-ORGANIC CAUSES OF FATIGUE*

A Concept of Fundamentals

NORMAN JOHNSON, M.D.
Minneapolis

FOR most of us, life had already begun when death claimed one whose discoveries and investigations added more to our present understanding of human diseases than did the contributions of almost any five scientists you might name. It was Louis Pasteur whose theories concerning the causation and communicable nature of certain diseases were so admirably supported by his experimental evidence that the world had to listen and learn. His brilliant work formed the foundation for our present understanding of infectious diseases and states; our rapid advances in surgery; much of our public health work and preventive medicine; the effectiveness of immunology; our interest in the control of supplies of milk, water, and foodstuffs; and innumerable ramifications which could be listed.

But however valuable to humankind we may judge the effort of this one man in the fields mentioned, it is apparent that one teaching of his has thus far either escaped notice or has been underrated; and this teaching may contain as much of value for the growth of medicine as any or all of his better known contributions.

His statement was simple, but full of implication and capable of tremendous expansion into specific field of endeavor. He taught that "without theory, practice is mere routine born of habit."

Immediately arises the question: What percentage of persons presenting themselves to us for help receive only that which they have been trained to expect—an habitual routine? And is this routine adequate to meet all ills? Do we attack all of these problems with minds habitually closed to possibilities of physiological disturbance not strictly in accord with the traditional teachings of cause and effect received in our schooling? Are we so easily satisfied with a ready answer that we miss the truth?

If we are interested in this kind of self-examination, it may be profitable to examine first the routine into which we have been moulded. Visualize our world! In those quarters of the globe most familiar to us, the vast majority of humankind attack the problem of Life with one conviction dominant—that the maximum satisfaction to be obtained from life is directly proportionate to the degree of material accumulation. So nations, municipalities, and individuals devote inordinate amounts of time, thought, and energy to economics as a cure-all for the World's ills. Consider Science! The intelligence and ingenuity of mankind is applied to the search for Truth concerning the natural laws governing his Universe. "Nature is governed only by learning to obey her." Thus far man's ingenuity has developed capacity for profitable investigation *only* in those fields where his five senses may be utilized; that is, in the material or tangible spheres such as chemistry, electricity, hydrostatics, physics. Man may toy with the intangibles of life, but his reasoning ability is as yet too immature to establish facts from his theories. Whereas, could he but appreciate it, the intangibles of life may be of far greater importance to him than the tangibles. At least our present exclusive emphasis on tangibles seems to have produced a world definitely out of balance.

Remember your medical training! Presumably it dealt almost exclusively with a presentation of human ills caused by material forces such as bacteria, neoplasms, trauma, poisons,—the organic diseases. Hospitals in which you trained were natural repositories for only that type of case. The men who trained you had lived so long in that atmosphere that they were seldom able to visualize a disturbed physiology produced by any means other than material factors. Ingenious methods had been devised to remedy situations brought about by the "organic" causes of abnormal physiologic behavior but no one seemed to know what to do about the occasional "functional" case other than to label it, speak to the patient about "nerves," and perhaps deal out some sedative. Like you, I received such a training and then found a routine born of this habit to be inadequate to meet all the symptoms which patients asked me to relieve or eliminate. If humans were merely pieces of machinery and subject only to disturbances of mechanical origin, then we might effectively serve them by training ourselves to be glorified garage mechanics. But the human is more than a piece of machinery and we must possess in addition some qualifications of the engineer and the architect in order to rebuild machines whose parts are true to specifications but whose functional performance is far from the normal.

---

*Read before the Northern Minnesota Medical Association, Brainerd, Minnesota, September 11, 1934.

In its present mood, Science is reluctant to admit the validity of any theory which cannot be subjected to proof in a laboratory. It must therefore concentrate, like the rest of the world, on mechanistic fields, and has so much unfinished work ahead that little time or thought can be given toward bringing up-to-date our knowledge of the intangibles. But since the human is a machine influenced both by tangible and by intangible agencies, the Science of Medicine must resist with all its power the tendency to fall too completely into the materialistic dogmatism which has brought stagnation and imbalance to the thinking of our century. Fortified by the teaching of Pasteur, whose thinking was untrammeled by too much materialistic restriction and was, therefore, productive, I venture to impose upon you a theoretical concept of possible influences, not organic or tangible, which may set in motion disturbances in physiology as severe as any produced through organic disease. If these influences are truly fundamental, the avenue toward therapeutic attack is open and within the capacity of human ingenuity.

Let us think again about this human machine that sometimes falls ill. It is really a blend or a fusion of two distinct components, each division serving a different purpose and directed by an entirely different method of control. It is with these methods of control that we are chiefly concerned. In order to dispose of it, let us first deal with that component which chronologically and embryologically developed last. This half we may call the frame, or chassis, with its steering apparatus and its driver. It does not get its main development until after birth. Growth and improved function come with training as the years go on. Its control or driver is capable of education, and of choosing what course the machine is to take. Motion in this structural half is chiefly purposive—the result of a mental process of selection based on thought—the outcome of logic or reason. The degree of development of this capacity to reason differs immensely in various individuals. Originally man lived solely by instinct, and many still continue to be ruled completely by their impulses. In emergencies, our reasoning processes move too slowly and are too insecure for us to depend upon; hence most of us revert to instinctive reaction. But most specimens of so-called "civilized" mankind steer their courses, plan actions, and dictate policies for the human machine on some sort of reasoning basis. This method of control by choice or selection let us for the moment call "Will." It is one of the two compelling forces driving men to action and the chief one which dictates motor activity for the chassis.

The other component part of the total human may be likened to the power plant. It is the more primitive development, reaches maturity sooner, and after birth is not subject to further academic training but may be influenced to change by habitual repetitions or by the necessity for compensatory adaptation. In this division is the fueling and combustion-chamber, the pump and pipes for circulation, air intake and exhaust—those vegetative processes having to do with metabolism, heat, water-balance, gas-exchange and the like. Practically all of these functions are automatic in nature—and this of necessity is so since they must go on whether the owner is awake or asleep, conscious or unconscious. So complete is this divorce in method of control that the thing we call "Will," no matter how strongly it may wish to do so, has no more influence over the functional rate or efficiency of any organ than the one sitting behind the wheel has over the firing of gasses in the cylinders of his car. Yet, strangely enough, certain of the intangibles in life may have great influence over the motor activity of any of the groups of cells which form the various physiologic units or organs. Fear, anger, hate, jealousy, pride, greed, worry, anxiety, disappointment, self-consciousness, self-pity, despair, and many other such stimuli to emotional centers may have tremendous power for stimulating or inhibiting this automatic machinery. The effect of over-stimulation or inhibition on the physiology is in no wise different from that produced by bacterial irritation, trauma, poison, or any mechanical means. If pain results, it is just as uncomfortable with either etiology. Whether this reaction to an emotion is brought about by direct action upon smooth muscle, or is secondary to the outpouring of epinephrine, acetylcholine, thyroxin, or some other chemical catalyst, is of no particular moment to us here. The important point to remember is that our machinery is geared directly to our emotions, and that some degree of emotional by-play goes on throughout most of our conscious life. It is worse than futile—it is asinine—to treat with vaccines, or surgery, or any other mechanical ritual, a bloody diarrhea with abdominal cramps caused through the unhappiness inflicted by a jealous husband. One must be more than a garage mechanic to understand human machinery. It must be recognized that attitudes as well as cancer may produce weight loss, and that in either case there may be a cloudy sinus by x-ray, or even an abscessed tooth, which has nothing to do with the picture. Patients may have inherited a volatile emotional equipment, or they may have trained it by long practice to be "hair-trigger," or they may merely have failed to appreciate that they were making no effort to check a tendency to frequent emotionalization until the habit has been thoroughly acquired. That such trends can be altered for better or worse is evident on every side of us if we will but observe.

People consult doctors because one of two symptoms occur: either they have pain or they have fatigue. The fatigue may involve the whole constitution; or it may be the exhaustion of a single organ like the heart. Evaluation of the causes of fatigue, therefore, are almost as important diagnostically as evaluation of the causes of pain. Both pain, and local or total fatigue, may be the end-result either of physical and material factors or of intangible and non-material influences. Obviously, if fatigue is the complaint which prompts the patient to ask for help, any attempt to treat a fatigue produced by non-material influences with a therapy designed to remedy fatigue brought about by physical factors cannot achieve great success.

Constitutional fatigue is often a prominent symptom (and sometimes the first or the chief symptom) presenting in Addison's disease, anemia, myxedema, coronary insufficiency, renal insufficiency, chronic sepsis, wasting diseases, focal infection, auto-intoxication and several other morbid states. The intent of this paper, however, is to offer a concept of the origin of functional causes for fatigue. One must somehow explain, in terms of disturbed physiology, the alterations which have produced pain or fatigue even though these symptoms did not originate in material factors. No better explanation suggests itself for such "functional" disabilities than that of overstimulation of organic structures in this second division of the human machine. Either the afflicted individual is, by heritage or by training, unduly receptive to ordinary stimuli or he is forced to face an unusual amount of extraordinary stimuli. Since he cannot exercise selective control by Will over this part of his machinery, stimulation may become automatic and continuous to all groups of cells and he does not know how to shut off the current. It is on this basis that an ultimate decompensation of some overstimulated part occurs. We call it a "functional" ailment.

When, in a heart which has acquired certain disadvantages like incompetent valves, the well-known laws of physics and hydrostatics are violated, the resulting penalty is called decompensation. Because we know the law which was violated, we can back-track and teach the decompensated individual how to put things right and how to live in accordance with the law. It is my conviction that similar laws of conduct, of attitude, and of behavior are in existence and operative; that they may be searched for, found, and postulated; that each time they are violated, especially by someone with pre-existing damage to his emotional-autonomic system, the resulting penalty will be decompensation either in the form of pain, exhaustion of function in some local organ, or constitutional fatigue; that the proper therapy can come only through: (1) the establishment of such laws of conduct and then (2) by instruction of the patient in the art of living in conformity with such law.

Constitutional fatigue has become almost an epidemic in these times. Much of it is on a functional basis but this in no wise diminishes its disabling potentialities. It is extremely important to recognize it because, if permitted to continue to the severer grades of decompensation, it requires about two years of very sheltered existence and carefully managed life to bring the individual back to earning power again. Furthermore, in the early stages of decompensation, it is possible to use education and reason to show the patient how to turn himself about, but in the severer cases, powers of adaptation are completely exhausted and the patient is absolutely unable to lift himself by his own boot-straps. To know what physiologic alteration occurs in this type of fatigue would possibly be helpful, and a great many theories could be postulated. All I may contribute here is the fact that such cases are common and the effort to show upon what basis they may develop.

Point 1.—You will easily tire if you force yourself to perform some task which you heartily dislike whereas you can put forth five times as much energy in the performance of something for which you have great enthusiasm without more than a transitory fatigue—like golf, or hunting trips. I am indebted to Capt. Hadfield of the English Army for the explanation. He has attempted to explore the secret which governs the occasional superhuman powers coming to one man and the tremendous exhaustion which may disable others. He concludes that we are motivated by the two forces already mentioned,—by impulse and by the thing we called Will. Man gets his superhuman strength when his instinct or impulse (which is usually the stronger force) violently urges some policy and his Will gives complete and unqualified approval. Conversely, he may experience complete and utter fatigue when impulse strongly dictates a policy and Will violently disapproves. So with the "shell-shocked" in the War. Impulse dictated self-preservation; Will demanded exercise of duty and acceptance of danger. The result may be complete exhaustion lasting over a period of years. Impulse and Will were in complete accord over your golf course game but at variance when your wife asked you to beat the carpet. Hence your variable response to the energy output.

Point 2.—All of your life you have been educated to put an emphasis upon results. There is no quicker way to a downfall, especially if you are conscientious and the results will not come about as you would like. Consider what would happen if you approached each patient with mind focused upon the possible results of your action or lack of action. You would certainly develop your coronary occlusion before your fifty-eighth year, unless you were forced sooner to retire from practice as did one young medico whom I interviewed recently. Violation of this law explains the vomiting by a bright Senior student which has twice prevented him from passing his surgery examination. Learn to accept every obligation and responsibility in the same mood as you pick up a cross-word puzzle: give your best effort and let the result happen. If you give your best, it will automatically produce the best result of which you are capable. But keep your focus on the performance.

Point 3.—Learn and teach how to work fast, or long, without getting mentally in a hurry. Again, keep your focus on the piece of wood under the saw and not on the last piece in the pile. Learn to keep mentally relaxed every minute when there is no need for tension. Remember the heart works twenty-four hours a day and gets sufficient rest by an accumulation of brief diastoles, each one of which is a very small fraction of a second; but during that diastole, the heart will not permit itself to be stimulated.

Point 4.—Learn and teach adaptation to and acceptance of an adverse fact. If it is not to your liking but is surely a fact, you cannot alter it. Therefore accept it, make your readjustments, and change your emphasis concerning it. To butt your head against a stonewall which cannot be climbed, tunneled, or circumambulated, or to permit your patients to do so, is the height of unintelligence. Many a weary soul today got that way because he thought he needed $5,000.00 per year and could only find $3,000.00. How do the poor devils on $2,000.00 get along?

Point 5.—The most basic law of all and most often violated. Five hundred years ago in the physical (material) world, the peoples of this planet began no longer to believe that their globe was a center around which all other planets revolved. During these last five centuries, most of the population have come to believe that ours is just one more planetary body traveling in its orbit. Although for nearly 2,000 years the Christian, and probably many another religion has taught the contrary, we as nations and as individuals go blithely on, firmly convinced that our individual or national entities each must be the center around which all of the rest of the world revolves. This fallacy produces 90 per cent of the disagreeable emotional upheavals of mankind, and still we cling to it. Remember that your most joyous experiences have come to you at a time when your attention was riveted on some consuming interest, on some goal for which you were striving, on anything but your own relative position in Life. If the jealous husband had been more concerned with his wife's pleasure when she seemed to be enjoying that dance than he was with his own relative position in the threesome, he would certainly have given her less unhappiness and himself less paroxysmal tachycardia and peptic ulcer. And had she felt less sorry for herself over the injustice of the thing but more concerned for his peculiar predicament, she would have saved herself an appendectomy, much instrumentation of the bowel, and six months of bedridden days and sleepless nights. The football player, surrendered completely to his game, is unaware of the pain from a broken rib until after the contest when he has opportunity to think about himself again. Yet Medical Science is content to use salicylates, amidopyrine, or morphine for alleviation of pain and to disregard investigation of the basic principles of another natural remedy which stares us in the face. Again a routine born of habit.

Finally, if you are interested at all in this matter of fatigue, you can make some experimental observations upon yourself. As a group, you have been given by your education possession of superior knowledge concerning the laws of the universe. Your training teaches you logical processes of thought and avoidance of the fallacious reasoning produced by human desire, bias, and prejudice. The very nature of your work requires consecration to a life of service, so that it becomes habitual for you to submerge self in behalf of others. Egocentric attitudes are difficult to generate with such training. Some day when you are weary beyond description, following a series of sleepless nights and hard days, with a fatigue headache beginning to appear, watch carefully what happens to that fatigue (and even to the headache) when called out on some real emergency. The conflict between the desire to loaf and the Will to be of service is settled when the Will gives the impulse a sound mental spanking and brings it into complete accord with the action. The focus is turned away from self and directed intensely on someone in great need. When all is over, you may find the fatigue and headache gone. To continue the experiment, sit then in meditation over the many injustices done you; permit your professional brother to hurt your pride; or develop a petty jealousy about his apparent success. Having allowed this concoction to stew for a time, tackle a series of charity patients and watch your fatigue mount. When you have reached a point where you are no longer civil to your family, when you resent each new intrusion upon your rest or play, when you must force by Will against your impulse to abandon the office, then take yourself off on a vacation. There you will burn up three times as many footpounds of energy per day as you did at home but with this difference,—the Will dictates it as reasonable and the impulse is in complete accord. In this manner you will again eliminate fatigue. At the conclusion of your experiment, sit in reflection concerning all of the evidence, and perhaps a new meaning will be shed upon some of the things I have just tried to say.

338 LaSalle Bldg.

CUTIS VERTICIS GYRATA FORMATION*

JOHN F. MADDEN, M.D.
Saint Paul

CUTIS verticis gyrata is the name of a condition of the scalp wherein the topography resembles that of the cerebrum because of the formation of convolutions and furrows. It is a descriptive term which in no way indicates the cause or the underlying pathologic changes in these peculiar formations. I have had the opportunity to observe two patients during the past year who strikingly demonstrate the fact that a final diagnosis must not be made from inspection alone. Although a diagnosis of cutis verticis gyrata might have been made on each of these cases, further investigation was necessary in order to outline the treatment and to make a prognosis. In the one case a malignant condition was discovered, while in the other only a banal inflammation with a favorable prognosis was found.

In order to understand better the anatomic basis for cutis verticis gyrata formation, I shall review here briefly the anatomy of the scalp. The skin, superficial fascia, and the occipito-frontalis muscle with its aponeurosis form the scalp. It is attached to the underlying pericranium by loose connective tissue called the subaponeurotic layer. The skin of the scalp is the thickest in the body except that on the heel, but the scalp is ever so much more pliable. The thickness increases from the front to the back. The superficial fascia consists of a network of connective tissue fibres which run from the skin above to the aponeurosis of the occipito-frontalis muscle below. The connective tissue bands of the superficial fascia bind the skin so firmly to the aponeurosis beneath that when the skin is moved the aponeurosis is carried with it. Contraction of the occipito-frontalis muscle causes the skin of the forehead to wrinkle transversely and the scalp to move forward and backward in some instances. The scalp muscles in humans are rudimentary and are not as well developed as in mammals.

When tumor cells, nevus cells, or infiltrates are found in the first or second layers of the scalp, they usually appear between the bands of connective tissue. It is easier for the invading cells to displace the fatty tissue and loose structures between the strong connective tissue bands than to displace the bands themselves. This results in folds and gyri, or cutis verticis gyrata formation. The folds are usually in the same direction in certain parts of the scalp. Over the parietal and frontal area this course is anterio-posteriorly, while over the occiput and neck they run laterally. The folds are in the direction of the "Langer lines," which in turn are dependent on the direction of pull of the scalp muscles.

Those cases due to tissue hypertrophies Stratton[20] explained on the basis that certain types of tissue tend to grow faster than others. He stated that the tissue of the epidermis and corium, for instance, might stretch to a greater degree under certain conditions than would the dense fibrous connective tissue bands; this would cause the scalp to lie in folds. If the bands of fibrous tissue connecting the skin and fascia are destroyed by infiltrating cells, the furrows and holds are lost.

There has been much discussion in the literature as to what constitutes the "true" and "false" types of cutis verticis gyrata and authors have made various classifications on this basis. There are many pathologic processes which may appear as cutis verticis gyrata at some point in their course, therefore it seems more appropriate to me to make a list of diseases which may have this physical characteristic than to divide them into groups of "true" and "false." For, in my opinion, cutis verticis gyrata is a descriptive term and, if present, cannot be false just because the basis is pathologic rather than anatomic.

Cutis verticis gyrata formation has been found in the following:

1. Developmental anomalies
2. Connective tissue hyperplasia
3. Nevi
4. Tumors
5. Inflammations
6. Endocrine disturbances

---

*From Division of Dermatology and Syphilology, University of Minnesota, Dr. H. E. Michelson, Director, and the Dermatology Service, Gillette Crippled Children's Hospital, St. Paul, Minnesota.

7. Following trauma
8. Association with constitutional disease

Having reviewed the written works on the subject of cutis verticis gyrata, I am only citing some of the pertinent literature.

A developmental anomaly of the skin of the scalp was the first diagnostic entity to be called cutis verticis gyrata. Such a case was demonstrated by Jadassohn[11] before the Ninth Congress of the German Dermatological Society at Berne. Later Unna[23] described three patients to whose condition he gave the name of cutis verticis gyrata. The cause of cutis verticis gyrata formation in cases such as those ascribed to development anomalies is due to a superfluity of integument which becomes pushed together into fold formations. Fischer[5] likened the condition unto the fold formations in the scalps of lions, tigers, pumas, and bulldogs. In animals the fold formation can be produced or increased voluntarily by the action of the scalp muscles. However, man has lost the power to wrinkle the scalp along with the reduction in size of muscles of the scalp. The anomaly as it appears sometimes in man is very likely an atavistic phenomenon, a throw-back to that period in evolution when humans could voluntarily wrinkle or fold the scalp. In this condition the skin is normal grossly and microscopically and is as thick in the furrows as in the folds. Belonging to this group of developmental anomalies is the type of cutis verticis gyrata seen in mental defectives of the microcephalic type. The disparity in development, where the skin develops in the usual way while the growth of the brain and skull is retarded, causes this superfluity and the resulting fold formation. Cutis verticis gyrata is a racial characteristic of some primitive African tribes. The members definitely inherit this peculiar fold formation of the scalp and forehead.

Fischer demonstrated a case which he thought to be due to congenital connective tissue hypertrophy. Alderson[1] reported a similar case, but was of the opinion that the tumor might have been neuro-fibromata.

Nevi have caused fold formation. This has been demonstrated by Jadassohn, Unna, Oliver,[16] Fischer, Jordan,[12] Lenormant,[13] and others. The nevi may be the ordinary pigmented or non-pigmented moles, neurofibromas (Fischer), neurinomas (Jordan, Masson[14]), or fibromas.

Jordan thought that the cases of nevi cited showed juxtaposition of three tumor or tissue types in the following forms: (1) multiple tumors in one case of different kinds; (2) individual types appearing in different patients as tumors of the same location and appearance; (3) tissue of different types appearing in the same tumors. The three types are nevi, neurinomas and fibromas. He thought that both neuromas and fibromas are derived from nerve sheaths and often associated with von Recklinghausen's disease. Jordan agreed with Masson that, aside from leukemic tumors, probably all tumors appearing in form of cutis verticis gyrata are related to the nerve sheaths.

Many banal inflammations can cause cutis verticis gyrata. There has been no explanation offered to show why a very small percentage of common eruptions cause fold formation in certain scalps. The type of inflammation, the degree of involvement, and the duration of the disease seem to play a minor role in comparison to the individual's predisposition to cutis verticis gyrata formation.

The literature contains cases said to be caused by eczema (von Veress,[24] Pospelow[18]), impetigo (von Veress), psoriasis (von Veress), frequent furuncles (Audry[3]), chronic folliculitis and perifolliculitis (Hudelo and Richon[10]), pemphigus in cases where bullæ on the scalp became pustular (Truffi[22]), acute inflammation of the scalp (Stratton), and chronic inflammation of the scalp (Parkes-Weber[25]).

Several cases have been listed where the scalp was the site of some inflammation several years before the appearance of cutis verticis gyrata. Boygrow[4] described a case in which erysipelas occurred two years before fold formation. Whether the previous inflammations had anything to do with the cutis verticis gyrata formation is very doubtful, but if such a relationship existed, it would be too remote for definite proof.

Diseases of the endocrine glands, particularly those which lead to increase of tissue and general skin changes, occasionally show cutis verticis gyrata sometime during their course. This is especially true of acromegaly, myxedema and cretinism. Gronberg[9] cited ten cases which occurred in acromegalics, and similar examples were seen by Foerster[6] and Renander.[19] Jordan stated cutis verticis gyrata occurred in myxedema and gave illustrations in support.

Cases of cutis verticis gyrata following trauma to the scalp have been reported by Glaubersohn and Iwanoff,[8] Stühmer,[21] and Galant.[7] Alderson[2] reported a patient of his who was struck on the head with a piece of wood. An infected wound resulted, which healed in two weeks. However, cutis verticis gyrata soon appeared and the formation has persisted for fifteen years.

Constitutional disease, as we know the term, is not an important factor in cutis verticis gyrata formation. Wise[26] and others have associated cutis verticis gyrata with syphilis. In some of the recorded cases no definite relationship between the two conditions could be proved because the fold formation was found accidentally and the syphilis was of undetermined duration. The fold formation did not improve under antisyphilitic treatment. Leukemic tumors have been seen to take on cutis verticis gyrata formation by Pelagatti[17] and others.

Fischer cited a series of eighteen cases of fold and gyri formation which were studied microscopically. Four showed normal skin, five showed characteristics of the primary inflammation, two showed hypertrophic connective tisue change, six showed nevi, and one showed changes such as seen in acromegaly. Merenlender[15] recorded twenty-two cases studied histologically with the following results: five had normal scalps, seven had inflammatory changes, four had hypertrophic changes exclusively in the connective tissue without inflammation, and seven had nevi of the scalp. The two series seem to correspond with the average percentage of each type found in the literature.

Jordan stated that in his case besides endotheliomatous tissue in the sense of dura tumors, there are discs and bands which remind him of neurinoma tissue. Many discs and bands resemble "touch corpuscles" which, according to more recent opinion, originate from Schwann cells. In this juxtaposition of nevus cells and of neurinomatous tissue and in the close relations of these to one another, the tumor corresponds largely to the neuro-nevi of Masson. In the fold formation obviously the same type of growth appears which is found in the plexiform neuroma. In the case cited by Jordan there was enlargement of the sella turcica such as was observed in neurofibromatosis, without disease of the brain or pituitary gland.

Not all tumors of the scalp form cutis verticis gyrata. Of those which do not, many have characteristics in common. Usually they do not spread by continuity but arise from distinct and widely separated locations on the scalp; this is especially true of multiple basal cell epitheliomas of the scalp, or the so-called turban tumors. Often tumors not resulting in cutis verticis gyrata are single and grow equally in all outward directions; this is particularly true of the cysts of the scalp such as cerebral hernias, hernias of the meninges, angiomas, dermoids, atheromas, hemorrhagic cysts of sinuses (sinus pericranius) and traumatic cephalohydroceles When the growths are multiple, they are often of a high degree of malignancy, and the patients may die before the tumors become confluent or form folds. Metastatic thyroid malignancies and hypernephromas illustrate this group. Others degenerate and change their form so much that fold formation is impossible. Gummas liquefy and ulcerate before folds are formed. Tumors of tuberculous origin, such as scrofuloderma, necrose and form sinus tracts early in their development. Some arise from bone or are closely associated with bone, and the scalp involvement is often secondary; osteomas and gummas are examples of this type. Each of these groups of scalp tumors not usually occurring in the form of cutis verticis gyrata illustrates one or more important points which are unfavorable for fold formation, namely, origin from distinct and widely separated locations, uniformity of growth, cystic formation, very rapid growth, early ulceration or degeneration, and bony origin.

From a study of the reported cases it is at once evident that no one etiological factor is preeminently prominent. The following two cases illustrate strikingly the wide variation in the possibilities of cause.

Case 1.—Melanoma of the scalp with malignant degeneration illustrating cutis verticis gyrata formation in a nevus.

G. J., a white boy six years of age, was admitted to the Gillette State Crippled Children's Hospital on December 21, 1933, because of a growth on the scalp. The tumor consisted of three folds and two gyri with a nubbin projecting anteriorly from the most lateral fold. The tumor was painless and could be moved freely over the skull with the rest of the scalp. The lesion covered most of the right anterior quarter of the scalp and extended down onto the forehead and slightly over the midline to the left. The growth stopped abruptly. The folds were approximately an inch thick, of which the central fold was the largest. The nubbin was about the size of a large walnut. The color was not uniform; the posterior and lateral portions were a glistening white, while the mid-portion had a blue tinge; the anterior part was bluish-red. The projection was an angry, deep, violaceous color. The lesion was entirely free from hair and it had the consistency of hard rubber. The nubbin was slightly softer than the rest of the tumor.

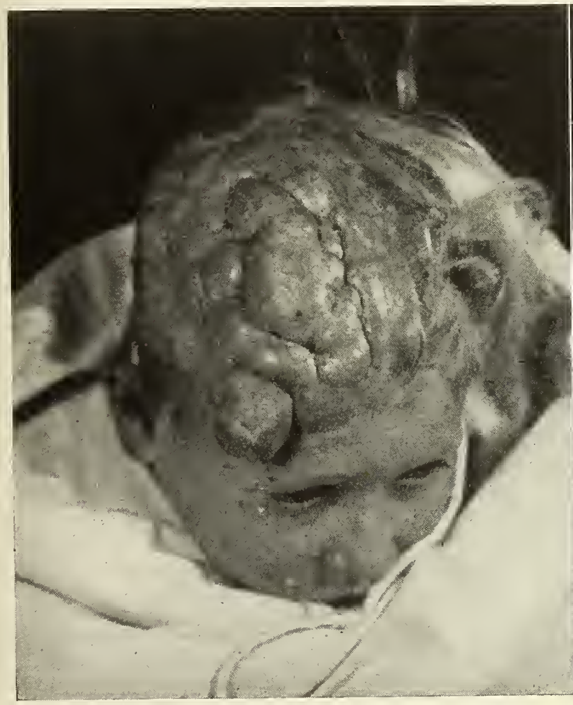


Fig. 1, Case 1. Melanoma of the scalp with malignant degeneration illustrating cutis verticis gyrata formation in a nevus.

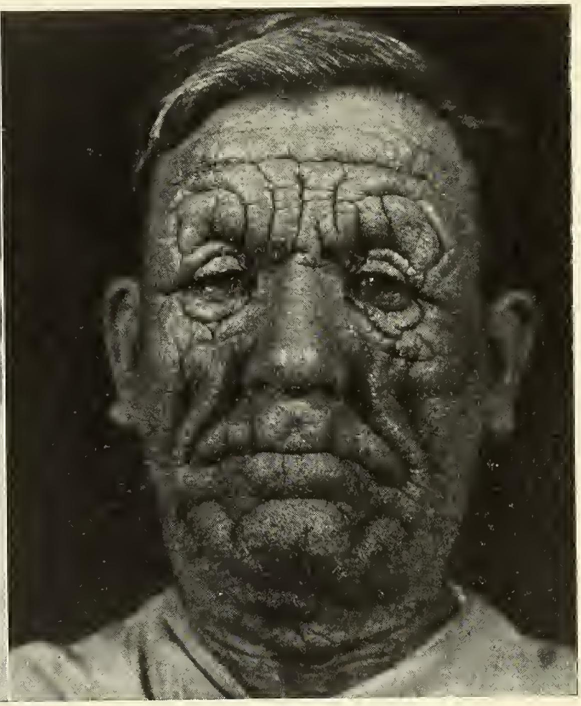


Fig. 2, Case 2. Fold formation on the face accompanying cutis verticis gyrata of the scalp in a case of chronic sensitization dermatitis.

The patient's father stated that the lesion was present at birth. It was perfectly flat at birth and covered about the same surface that it did when the patient was first seen. The tumor grew very slowly in thickness until two years ago. The patient was kicked in the head at that time, and after the injury, growth was more rapid, especially in the anterior portion. The fold and gyri formation appeared during the first two years of life and gradually became more pronounced. The nubbin extending from the most lateral fold grew very rapidly during the last six months of 1933. The tumor was black at birth, but it gradually lost color until about January, 1933. Then the bluish-red tinge appeared and became steadily more pronounced.

There was a painless submaxillary and subauricular lymphadenitis on the right side. This first appeared when the child was two years old and increased slowly. Growth was more rapid during the last half of 1933. The mass of glands was about the size of half an orange, and discrete glands from the size of a bean to an olive could be palpated. They were soft to the touch. There was no change in the color, texture, or temperature of the overlying skin. The rest of the physical examination was essentially negative. The family history was of no importance.

The blood Wassermann reaction was negative. Roentgen ray pictures of the skull showed no bone disease. The blood picture was within normal limits at all times.

The nubbin and two submaxillary glands were removed on March 3, 1934, by Dr. C. C. Chatterton. The glands were soft and friable. The entire tumor was removed on April 10, 1934. There were no adhesions to the pericranium, and the tumor shelled off the skull very easily. The wound remained clean, and skin grafts were done May 8, 1934, and by May 24, 1934, the lymphadenitis had disappeared. The patient now feels well and is gaining weight and strength. He weighed 41 pounds in December, 1933, and 48 pounds on May 21, 1934. This seems to be more than the average gain in weight for a healthy child.

Histopathology. The entire tumor was excised and fixed in 10 per cent formalin. Sections were made from different portions of the tumor. They were stained with hematoxylin and eosin and by the Weigert, Van Gieson, and Laidlow methods.

The epidermis was very thin in all portions of the tumor. It consisted of three to five layers of cells arranged in a straight line in the malignant portion. The rete pegs were partially abolished or flattened out in the benign portion.

The corium of the benign portion was made up roughly of three parts. The upper third was composed almost exclusively of connective tissue bundles. The connective tissue was arranged in whorls and strands and became denser as the subcutaneous tissue was approached. The middle third was made up of numerous dilated blood vessels scattered among the connective tissue bundles. The lower third consisted of nests of melanoma cells dispersed throughout the dense connective tissue. There was a gradual replacement of connective tissue by melanoma cells arranged in nests and strands as the malignant portion was approached. In the tip of the nubbin the melanoma cells had displaced about two-thirds of the connective tissue.

The small amount of melanin present was in the cells of the malignant portion. The cells themselves showed irregularity in the size of the nucleus and cell, vacuolation and lobulation of the nuclei, and occasional dumb-bell shaped nuclei suggesting amitotic division. Microscopic sections were submitted to Dr. S. W. Becker of the University of Chicago because of his interest in this type of tumor. His diagnosis agreed with the above description.

The elastic fibers were normal, but reduced in number. Sweat glands, sebaceous glands, and hair were totally absent in all portions of the tumor. There was no evidence of nerve tissue in any of the sections. The submaxillary lymph glands showed only banal inflammatory changes.

Case 2.—Chronic sensitization dermatitis illustrating fold formation on the face and cutis verticis gyrata formation in the scalp due to chronic inflammatory changes.

Mr. P. J., aged 71, a farmer born in Sweden, was referred to Dr. Michelson's clinic in 1925 because of a generalized eruption. He said that the eruption began on his forehead in the summer of 1923. This soon involved the face, hands, and arms, and in about six weeks the entire skin was affected.

The eruption began as an erythema accompanied by edema, burning, and itching. This soon became vesicular, weeping, and crusted. After a time the eruption would quiet down and appear as dry scaling on an erythematous base. The severe pruritus remained at all times, but in the summer when he was out in the dust, sun, and wind, it became worse.

When the patient was seen in 1925, the eruption was confined to the face, scalp, neck, and hands. A diagnosis of leprosy was considered because of the peculiar leonine facies. The skin of the face, neck, and scalp appeared in deep fissures and folds. The skin was very thick, dry, dully erythematous, and covered with excoriations and a dry, fine scale. The eyelids were so thick and edematous that the patient's eyes were barely visible. There was a generalized pea to bean sized lymphadenitis. The patient was next seen in March, 1934. Very little change in the eruption had occurred during his absence of almost ten years. The past history and family history were negative. Examination showed the urine and blood to be normal. The blood Wassermann was negative. No lepra-bacilli were found. Biopsy showed a non-specific chronic dermatitis.

Summary

The anatomy of the scalp is unique in that it favors the formation of folds and gyri because of the nature of its attachments. Therefore any collections, be they inflammatory or tumorous, will change the topography of the scalp, often resulting in a formation which has been known as cutis verticis gyrata. It is my contention that this may be a deceptive descriptive term, because the first cases described under this name were on a purely anatomical basis while later the same term was used to describe this formation due to pathological accumulations. If, then, the term is retained without due consideration of the underlying cause, many errors in treatment and prognosis are bound to be made. The external appearance produced in my cases, one being the result of inflammation and the other the result of tumor formation, might both have been diagnosed cutis verticis gyrata, but the causes were entirely different.

In conclusion, I would urge that this term be used for its descriptive value and that in every case a histological study is imperative for a proper evaluation and for a correct final diagnosis.

Bibliography

1. Alderson, H. E.: Cutis verticis gyrata. Arch. Dermat. and Syph., 6:448, 1922.
2. Alderson, H. E.: Cutis verticis gyrata following trauma and infection. 26:1020, 1932.
3. Audry, C.: Pachydermie occipitale vorticilée (cutis verticis gyrata). Ann. d. dermat. et de syph., 10:257, 1909.
4. Boygrow, S. L.: Ein Fall von Cutis verticis gyrata. Monatsch. f. prakt. Dermat., 1:16, 1910.
5. Fischer, H.: Zur Frage der Faltenbildung der Kophaut, inbesondere der Cutis Verticis Gyrata. Arch. f. Dermat. u. Syph., 141:251, 1922.
6. Foerster, H.: Discussion Stratton's paper. Arch. Dermat. and Syph., 27:392, 1933.

7. Galant, S.: Cutis verticis gyrata. Cor.-Bl. f. schweiz. Aerzte, 48:743, (June 1) 1918.
8. Glaubersohn, S. A., and Iwanoff, A. A.: Etiology, pathogenesis and histology of cutis verticis gyrata. Dermat. Wchnschr., 88:198, (Feb. 9) 1929.
9. Gronberg, A.: Is cutis verticis gyrata a symptom in an endocrine syndrome which has so far received little attention? Acta med. Scandinav., 67: 24, 1927.
10. Hudelo and Richon: Pachydermie vorticellée partielle due cuir chevelu. Bull. Soc. franc. de dermat. et syph., 30:311, 1923.
11. Jadassohn, J.: Eine eigentümliche Furchung, Erweiterung und Verdickung der Hautam Hinterkopf. Verhandl. d. deutsch. dermat. Gesellsch., 1906, 9:451, 1907.
12. Jordan, P.: Tastkörperartige Bildungen in einem zelligen Naevus der behaarten Kopfhaut. Zur Kenntnis des Neuro-naevus, des Neurinoms, des Psammoms, der Cutis und Pseudo-Cutis verticis gyrata und der Recklinghausenschen Krankheit. Arch. f. Dermat. u. Syph., 169:105-126, 1933.
13. Lenormant, C.: La pachydermie vorticellée due cuir chevelu; (l'étude clinique et anatomique; essais de traitement cherurgical.) Ann. de dermat. et syph., 6:225, 1920.
14. Masson, P.: Giant neuro-naevus of hairy scalp. Ann. Surg., 93:218, 1931.
15. Merenlender, J.: Cutis verticis gyrata and its latent form. Arch. f. Dermat. u. Syph., 149:564-569, 1925.
16. Oliver, E. A.: Cutis verticis gyrata (Unna). Arch. Dermat. and Syph., 6:6-9, (July) 1922.
17. Pelagatti, M.: Cutis verticis gyrata in a patient with a leukemic variety of chronic lymphatic leukemia. Gior. di clin. med., 5:161, 1924; abstr., Presse med. (supp.), 32:97, 1924.
18. Pospǐeloff, A. I.: Origin of cutis verticis gyrata (Unna). Russk. Jour. Kozhn. i Ven. bolǐezn, 18: 1-9, 1909.
19. Renander, A.: Skelettveranderungen bei einen Fall von Cutis Verticis Gyrata. Acta radiol., 9: 399-409, 1928.
20. Stratton, E. K.: Cutis verticis gyrata, Arch. Dermat. and Syph., 27:392, 1933.
21. Stuhmer, A.: Cutis gyrata der Stirn. Dermat. Wchnschr., 74:249, 1922.
22. Truffi, G.: Cutis verticis gyrata in foliaceous pemphigus. Arch. ital. di dermat. sif., 6:142, 1930.
23. Unna, P. G.: Cutis verticis gyrata. Monatsh. f. prakt. Derm., 45:227, 1907.
24. von Veress, F.: Ueber die Cutis Verticis gyrata (Unna). Dermat. ztschr., 15:675-682, 1908.
25. Weber, F. P.: Cutis verticis gyrata, Proc. Royal Soc. Med., 25:665, (March) 1932.
26. Wise, Fred: Cutis verticis gyrata—Report of a case. Interstate Med. Jour., 25:380, (May) 1918.

THE MILWAUKEE CONVALESCENT SERUM CENTER

MAURICE HARDGROVE, M.D.†

Milwaukee, Wisconsin

CONVALESCENT serum has been known to be of value in the prevention and treatment of various infectious diseases since the latter part of the last century. It was not until after August von Wassermann, in 1906, developed a reliable hemolytic test for syphilis that the danger of transferring this disease was eliminated. Since then, human serum has been used abundantly when available.

A serious handicap has been the difficulty in procuring an adequate supply prepared in a satisfactory manner. Authorized serum depots able to prepare and store large amounts of serum have not been developed in this country until recent years. One in Detroit under the City Health Department has been in existence for a period of ten years. Another in Chicago located at the Michael Reese Hospital has been in operation during the past four years.

The motive for the establishment of a human convalescent serum center in Milwaukee was the result of the successful treatment of a serious case of scarlet fever with convalescent serum. A child in that city was taken seriously ill one evening with the disease. A quantity of serum was rushed from Chicago to Milwaukee by special messenger. After receiving the serum the patient was so improved that the anxiety of the physician and the parents was greatly relieved. The whole aspect of the case had changed within twelve hours. The father of this child was so well pleased with the result of the serum that he wished to do something which would make it available to others. Upon the suggestion of the pediatrician who had cared for his child, he offered to help the serum center which had served him so well. Inasmuch as the Chicago institution was already well financed, Doctor Thalhimer, supervisor of that center, suggested that a serum center be established in Milwaukee. This was done in February of this year. Doctor Koehler and the entire Department of Public Health of Milwaukee coöperated to the utmost in giving this center a successful start.

The purpose of the Milwaukee Serum Center located at Columbia Hospital is to make convalescent serum available to patients who are suffering from various infectious diseases. It is a non-profit making organization. Its personnel, when in full operation, consists of a part-time physician, a full-time technician, a diener, and a part-time secretary. The equipment in the new serum center is comparable to that of the Chicago institution. The Milwaukee County Medical Society's Health Council, at a meeting in April, approved the Milwaukee Serum Center as "an ethical, scientific institution, producing various reliable convalescent serums."

---

†Director, Serum Center, Columbia Hospital, 3321 N. Maryland Ave., Milwaukee, Wisconsin.

There are two sources through which serum is obtained from convalescent patients. A list of recently recovered patients is obtained from the Milwaukee City Health Department. The family physician is called to confirm the diagnosis and to learn if he has any objection to the serum center's asking the patient to sell a small amount of his blood. If the physician confirms the diagnosis, and has no objection, the patient is given an appointment for the withdrawal of blood. Another source of scarlet fever convalescent blood is the South View Municipal Contagious Hospital, from which blood is obtained and where a certain percentage of the final serum is returned.

From the two hundred cubic centimeters of blood withdrawn from adults, approximately ninety cubic centimeters is later available as serum. The blood specimens are centrifuged several times, and the serum is withdrawn aseptically. When sterility and serological tests are found to be negative on the individual bulk specimens, twenty or thirty of these bulks are pooled, thus combining the effective power of sera from various types of cases and also mixing the various blood groups. After the pooling is complete the serum is run through a Berkefeld filter and vialed. When further sterility tests are completed the serum is ready to be dispensed. The various sera are dispensed only through the family physician and may be obtained at any time. The physician in charge of the serum center gladly gives advice as to its use.

In scarlet fever, the blood is obtained from patients after the eighteenth day of the disease until the end of the fourth month of convalescence. The scarlet fever convalescent serum is of value both in the prevention and treatment of the disease. It transfers a passive immunity lasting from ten to fourteen days. Thus, if a contact must remain in the house with a scarlet fever patient, he should receive prophylactic doses every ten days. The intramuscular route is satisfactory. In the treatment of scarlet fever the serum is of most value when given early, intravenously, and in adequate doses. It usually causes a reduction of the fever, the toxemia, the angina, and the rash. The duration of the illness is also thought to be diminished. Apparently the complications are reduced by one-half when the serum is given early. The usual picture in a severe toxic case is one of rapid improvement within twelve to eighteen hours. If it is given late in the disease, or in a case in which complications have already set in, larger doses are necessary.

In measles the blood is obtained from the end of the second week to the end of the second month of convalescence. In this disease, attempt should be made to prevent measles in exposed children who are undernourished or who are suffering from some other illness. If convalescent measles serum is given to children within five days after exposure it will prevent the onset of measles in the majority of the contacts. If the injection of the serum is delayed until the eighth day of exposure attenuation of the disease will usually occur, resulting in a mild attack which is followed by permanent immunity. This method of attenuation is the one of choice in healthy exposed children.

In mumps the serum has been used much the same as in measles; however, the serum is also thought to be of value in treating the disease and its complications.

Although the value of convalescent poliomyelitis serum is still debatable, some is always kept on hand. If it is to be used in the treatment of infantile paralysis it should be used in the preparalytic stage, and be given both intravenously and intraspinally.

Since this is human serum and not a foreign serum, the question of serum reactions can almost be disregarded. No serious reactions have been observed. Instructions as to the method of giving the serum and preparing the syringes should be closely followed.

The Milwaukee Serum Center has been inspected by Doctor George W. McCoy, Director of the National Institute of Health of the United States Public Health Service and has received a Federal license, which makes it possible for adjoining states to obtain serum from this center. By arrangement with the railway and air express, rapid delivery of serum is possible to any part of Minnesota.

EDITORIAL

MINNESOTA MEDICINE

OFFICIAL JOURNAL OF THE MINNESOTA STATE MEDICAL ASSOCIATION

Published by the Association under the direction of its Editing and Publishing Committee

EDITING AND PUBLISHING COMMITTEE

J. T. CHRISTISON, Saint Paul A. S. HAMILTON, Minneapolis
E. M. HAMMES, Saint Paul T. A. PEPPARD, Minneapolis
WALTMAN WALTERS, Rochester

EDITORIAL STAFF

CARL B. DRAKE, Saint Paul, Editor
W. F. BRAASCH, Rochester, Assistant Editor
C. A. MCKINLAY, Minneapolis, Assistant Editor

Annual Subscription—$3.00. Single Copies—$0.40
Foreign Subscriptions—$3.50.

The right is reserved to reject material submitted for editorial or advertising columns. The Editing and Publishing Committee does not hold itself responsible for views expressed either in editorials or other articles when signed by the author.

Classified advertising—five cents a word; minimum charge, $1.00. Remittance should accompany order.

Display advertising rates on request.

Address all communications to Minnesota Medicine, 2642 University Avenue, Saint Paul, or 324 Fourth Avenue South, Minneapolis. Telephones: Nestor 1381 and Dupont 1013.

BUSINESS MANAGER
J. R. BRUCE, Saint Paul

Volume 18 AUGUST, 1935 Number 8

Convalescent Serum Centers

Anyone who has witnessed the striking effect of massive doses of convalescent serum in the treatment of certain infectious diseases must certainly harbor the desire for a ready reservoir from which to obtain this valuable material.

Although placental extract may replace human serum in the attenuation of measles it is probable that the latter's field of usefulness may extend to include pertussis and parotitis as well as diseases in which specific prophylaxis with animal serum is contraindicated. Its therapeutic use may even be considered in pneumonias of known type.

The successful operation of serum depots in Detroit, Chicago and Milwaukee* should stimulate medical groups to enlarge the facilities now in use for this purpose at local contagious disease hospitals. By so doing they could offer services to the entire profession which are now confined to their institutions.

One might conceive of a "bureau" to be conducted by the local medical society with the cooperation of the health department. An agency of this type could operate as a serum center and serve in the registration and certification of professional donors for immunotransfusion.

E. S. P.

Typhoid Increase

Inasmuch as the presence of typhoid fever in any community has come in recent years to be a matter of reproach, the definite increase in the number of reported cases in the Twin Cities and surrounding area is cause for intensive efforts on the part of local and State health authorities to trace the source of the infection.

At the present writing more than 100 cases have been reported in Minneapolis and some fifteen cases in Saint Paul, since the first of May. Several cases have also occurred at Fridley, where Saint Paul taps the Mississippi River for its water supply, and also at Anoka, a few miles above Fridley on the Mississippi.

Investigation by health officers of Minneapolis and Saint Paul and the Department of Preventable Diseases of the State Board of Health so far indicates that all sources of the infection except the water supply can be excluded. It does seem remarkable, however, if the water supply of this area is contaminated, that a frank and widespread epidemic has not occurred.

Of course, the tracing of the source of infection in typhoid is generally very difficult and requires the services of an epidemiologist of unusual detective ability. There is always the danger of contamination of a city's water supply at its source and there is always the possibility of cross connections between private water supply of, for instance, a city office building and the city's supply, although such connections are forbidden by law.

Although during the past fifteen years the incidence of typhoid in the vicinity of the Twin Cities has been so low as to be almost negligible, prior to this period it was not unusual for either of the Twin Cities to have a hundred cases a year. So the present situation, while a distinct increase over recent years, is not so alarming as it may seem. The increase, however, is sufficient to warrant the energetic measures being taken to decrease the source of the typhoid and to prevent its spread.

---

*A report of the Serum Center in Milwaukee appears elsewhere in this number of MINNESOTA MEDICINE.

A State appropriation of some $20,000 has just been made to increase personnel and enable more extensive investigation of water and contents. The Minneapolis authorities have increased the chlorine content in the city's supply of water, have closed public drinking fountains and have advised the boiling of water for drinking purposes, in this way endeavoring to make the public water-conscious. Typhoid inoculation is recommended for those who of necessity must travel where typhoid is known to exist.

Doubtless in the near future the puzzling problem will be solved and, the source being discovered, the development of new cases will be prevented.

Demonstrations at the State Meeting

The scientific demonstrations have become a most interesting phase of our annual meetings. This year all the booths afforded interesting material for visitors.

Probably the most interesting exhibit was that presented by the Philadelphia Institute for Medical Research of guinea pigs treated with Hanson's thymus and pineal extracts. The rapid growth and sexual maturity produced in guinea pigs by the injection of thymus extract and the dwarfism and sexual precocity in the third generation following injections of pineal gland extracts constituted an impressive demonstration of a real scientific contribution to a field which is only beginning to be explored. The potentialities of human application plays riot with the imagination.

In the same field of endocrinology was the creditable exhibit of Dr. L. F. Hawkinson of Brainerd, who has a distinct flair for endocrine study. Photographs, charts and guinea pigs, elucidated by the demonstrator, made the entire subject seem perhaps simpler than it is.

The hay fever exhibit by Drs. Ellis, Rosendahl and Dahl was beautifully arranged. Specimens of the seeds of various trees, grasses and weeds, and charts showing seasonal pollination and prevalence offered much material for study. There is still need of simplifying for the general practitioner procedures for testing and treating hay fever sufferers.

The educational value of wax models was demonstrated in several booths. Models of tuberculosis of the mouth and ear were displayed by the Glen Lake Sanatorium staff, and those of cancer by the American Society for the Control of Cancer and the State Cancer Committee. A model in the Mayo Foundation exhibit showed clearly the various conditions which might produce asthma symptoms, and numerous models illustrated various types of diaphragmatic hernia.

Dr. E. K. Green's tularemia exhibit this year was better than ever. Although tularemia is not frequently encountered, the marked increase in recent years in reported cases in Minnesota is cause for some apprehension, even if recognition of the infection accounts for much of the apparent increase. The discovery of infected grouse and animals other than the rodents is not reassuring.

Dr. Nathanson's booth, where he demonstrated the production of cardiac standstill through pressure on the carotid sinus, attracted much attention locally and in scientific periodicals. Dr. Nathanson has been emphasizing for some time the fact that death in heart block is due to ventricular standstill and in most cases of angina pectoris and coronary thrombosis to ventricular fibrillation. The practical conclusions he has come to are that adrenalin is indicated in ventricular standstill due to heart block, while quinidine should be given in angina pectoris or coronary thrombosis in cases showing evidence of ventricular irritability (extrasystoles).

Those interested in medical economics could find interesting material in several booths. The American Medical Association had on display charts showing trends in medical practice. The Minnesota State Board of Medical Examiners had the figures for Minnesota. It was interesting to note that in 1928 there were 162 registered osteopaths and 493 chiropractors, while this year the osteopaths number 160 and chiropractors 414. Since the passage of the Basic Science Bill in 1927 some thirty-three osteopaths have been licensed and only nine chiropractors.

The Parent-Teachers Association booth was busy handing out booklets explaining their Summer Roundup activities. It is surprising how many children enter school for the first time with unrecognized handicaps which delay their progress in school. The Summer Roundup movement advocates the child's visit to the family doctor and dentist before starting in school. If this is not financially possible the free clinics are available.

Numerous other demonstrations merit mention, but space forbids. This report would be indeed remiss if no mention were made of the Hobby Show. The display outdid expectations, due to the energy exerted by the committee of which Dr. Fred Olson was chairman. Doctors easily become slaves to their profession and there is no other vocation which needs an avocation more. That so many of our members have such worth while hobbies was quite a revelation.

In Memoriam

Charles Swenson

1876-1935

Born in Orebro, Sweden, October 18, 1876, Charles Swenson came as a child to this country with his parents, who settled on a farm near Rush City. After attending school in Rush City he graduated from Dr. Drew's School of Pharmacy and later, in 1903, received his medical degree from Hamline University.

Dr. Swenson began practice, in 1903, in Braham and the same year built the first Braham hospital, which has actively served the community until two months ago, when it was closed on account of the doctor's recent poor health. Following a mastoid operation in 1926, Dr. Swenson had suffered poor health which, necessarily, compelled him to restrict his activities, and complications which came last winter caused his death, June 22, 1935.

Dr. Swenson was married in 1903 to Zelma Lee of Rush City, who as well as his mother, Mrs. Magnus Lindstrom of Sauk Rapids, survives him. Two sisters, Mrs. A. E. Boppel of Shakopee and Mrs. Fred Boyce of Minneapolis, one brother, Harry Swenson of Saint Paul, and one half-brother, Harold Lindstrom of Sauk Rapids, also survive him.

Dr. Swenson was a member of the American Medical Association, the Minnesota State Medical Association and the East Central Minnesota Medical Society. For eighteen years he served as surgeon for the Great Northern Railway. He also served as director of the First National Bank of Braham, the State Bank of Mora and was president of the State Bank of Ogilvie. At one time he was mayor of the village and its health officer.

C. E. Gates

1879-1935

Dr. C. E. Gates, Anoka, died June 21, 1935, at the age of fifty-six, following a two weeks' illness.

Chester E. Gates was born in Dover, Minnesota, in 1879. He graduated from the Rochester, Minnesota, high school in 1900 and received his medical degree from the University of Minnesota in 1904. In 1907 he married Miss Inez Harvey, a high school classmate.

Dr. Gates was associated with the State Board of Health for three years following graduation and practiced in Goodhue from 1907 until 1917. He was with the Cobb Clinic, Saint Paul, for a year before locating in Anoka in 1918.

Dr. Gates was a member of the East Central Minnesota Medical Society, the Minnesota State and American Medical Associations. He was an active member of the Methodist Episcopal church, a member of the Kiwanis Club and a Mason. He also belonged to the Alpha Kappa Kappa medical fraternity.

Dr. Gates is survived by his widow, a daughter, Emily, who is a medical student at the University of Minnesota, a brother, Arthur, of San Fernando, California, and three sisters, Mrs. S. S. Tuttle and Miss Ella Gates of San Fernando and Mrs. Earl Bixler of Aberdeen, South Dakota.

Herman M. Johnson

1873-1935

WHEREAS, The great and supreme Ruler of the universe has in his infinite wisdom removed from among us, one of our worthy and esteemed fellow-laborers, Herman Johnson, and

WHEREAS, The long and intimate relation held with him in the faithful discharge of his duties in this Society makes it eminently befitting that we record our appreciation of him,

BE IT RESOLVED, That the wisdom and ability which he has exercised in the aid of our organization by service, contributions, and counsel, will be held in grateful remembrance, and

BE IT RESOLVED, That his sudden and unexpected death leaves a vacancy which can not be filled in the society, his home community or the state, and

BE IT RESOLVED, That with deep sympathy for the bereaved relatives we can but hope that the memory of him which is ours and his spirit which abides will carry us all on to higher and greater accomplishments, and

BE IT FURTHER RESOLVED, That a copy of this resolution be spread upon the records of this organization, and a copy forwarded to the bereaved family.

(Signed) W. L. BURNAP
J. M. HAYES
L. L. SOGGE

The above resolution was passed by the House of Delegates at its June session. A similar resolution in appreciation of the time and effort expended by Dr. Johnson in the mutual interest of the public and medical profession was drawn up by the Executive Committee of the Ramsey County Medical Society on June 20.

MEDICAL ECONOMICS

Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association

B. J. Branton, M. D.
J. A. Moga, M. D.
W. F. Braasch, M. D., Chairman
J. C. Michael, M. D.
A. N. Collins, M. D.

Passed by the House of Delegates

Deliberations of the House of Delegates will be outlined in full in a later issue of MINNESOTA MEDICINE.

The following high lights are of especial interest and importance, however, and merit more than routine attention.

Membership Cooperating

From the report of Dr. E. A. Meyerding, secretary of the Association:

"The mid-point of the year 1935 finds the State Association in excellent condition from the standpoint of organization.

"The membership has increased substantially over last year at this time and the affairs of the Association and its component units over the entire state are proceeding with a marked absence even of minor difficulties and differences.

"The entire membership may be congratulated, I believe, for the soldierly manner in which it has carried on its work this year, loyally defending its high standards and maintaining its ethics in these times of unrest."

Reaching the Teacher

From the Report of the Committee on Public Health Education, Dr. L. R. Critchfield, chairman:

"The year 1935 has witnessed a departure in public health education in Minnesota.

"It has seen the establishment, after many years of planning and investigation, of a medical lecture course for teachers' colleges and training schools.

"This lecture course, which was carried on with the coöperation of the Minnesota Public Health Association, was inaugurated this year in five State Teachers' Colleges.

"A series of four and five lectures was given at each of these colleges and the interest and enthusiasm with which they were received is reflected in the unsolicited praise of superintendents and school officials.

"The importance of reaching the future teachers and educational executives of Minnesota with legitimate and authentic information in matters of health and disease prevention must be obvious to every physician.

"It has taken considerable preparation and much preliminary organization work among the colleges to inaugurate this course and the project is still in its infancy.

"A questionnaire sent to the heads of the five teachers' colleges shows beyond any doubt that these officials regard the first series as a valuable addition to their program and that they are hoping for an amplified course next year.

"A foundation is now being laid, we feel, for an important new field of study for student teachers, a study that is long overdue; in fact, we feel that every effort should be made by this committee to continue the work. . . .

Health Education

"Assuredly, the importance of public health education to the practicing physician grows with each shift in our changing social order.

"An intelligent, well informed public will choose a family physician and apply to him for every accepted protective measure known to medical science. It will apply to a physician for the essential individual physical check up so as to discover disease in its incipiency and thus save itself both money and suffering. Furthermore, an intelligent, well informed public will want that physician to be its own private physician in preference to any conceivable medical service that may be made available through compulsory, tax contributory health insurance.

"The chief problem before medicine today is not the re-organization of medical services as they are now functioning in America. It is surely the education of the public to the proper and complete use of the services already available.

"The regular services carried on year after year by this committee are designed toward that end. They should form an important and necessary link between the medical man and the public, never more important than now when dissatisfaction with the fact that there is unnecessary and unattended illness in the world is prompting many misguided reformers to exchange a workable system of medical care in America for European systems that have not succeeded in cutting down unnecessary illness elsewhere in the world."

On the Air

From the Report of the Radio Committee, Dr. S. R. Maxeiner, Minneapolis, Chairman:

"Our program (Tuesday mornings over WCCO, Dr. William A. O'Brien, Associate Professor of Pathology and Preventive Medicine, University of Minnesota, speaker) is still rated as one of the most popular and best known of all features from Station WCCO. The mail continues very heavy but an attempt is made to answer each letter promptly.

"There has been an unusual demand for personal appearances by our speaker, Dr. O'Brien. He has been unable to fill a good many of these engagements although he accepted approximately 100 during the period from June 15, 1934, to June 1, 1935.

Radio Reform

"Starting July 1, the Columbia Broadcasting System announces a change in policy.

"Children's program will be edited by a child psychologist and a group of experts. Patent medicine advertising for internal remedies and certain objectionable forms of external remedies will no longer be sponsored by the Chain or by locally owned Chain Stations.

"This means that cathartics and laxatives are 'off' the air with one exception in which a longer contract is involved. The amount of advertising in all programs is to be limited. We feel sure our program will be helped by this change in policy."

Medical Narratives

From the Report of the Historical Committee, Dr. John M. Armstrong, St. Paul, chairman:

"Your Historical Committee has now in form ready for the printer the following manuscripts:

1. History of Minnesota State Medical Association—Dr. Hamilton.

"The Narrative of Medicine in the following counties with biographies:

2. Ramsey—Dr. Armstrong.
3. Hennepin—Drs. Hamilton and Hansen.
4. Washington and Chisago—Compiled.
5. Goodhue—Compiled.
6. Winona—Compiled.
7. Scott—Compiled.
8. Blue Earth—Compiled.
9. Wabasha—Compiled.
10. Dakota—Compiled.
11. Freeborn—Compiled.
12. Nicollet—Compiled.
13. Carver—Compiled.
14. Brown—Compiled.

"It will be noted that these histories cover the counties bordering on the Mississippi, St. Croix and Minnesota Rivers, the oldest counties of the State.

15. Medical Legislation in Minnesota—Dr. Armstrong.
16. Medical Journalism in Minnesota—Dr. Armstrong.
17. Medical Instruction in Minnesota—Dr. Armstrong.
18. Medicine Previous to the Settlement of Minnesota—Drs. Hamilton and Armstrong.
19. History of the Southern Minnesota Medical Society—Dr. Hansen.
20. History of the Minnesota Academy of Medicine—Dr. Hamilton.
21. Edward Purcell, The First Physician in Minnesota—Dr. Armstrong.
22. The Asiatic Cholera in St. Paul—Dr. Armstrong.
23. Biography of Dr. Thomas S. Williamson—Dr. Hamilton.

"The following manuscripts have been collected by the Committee:

24. Diseases of the Dakota Indians—Dr. Thomas S. Williamson.
25. Dakota Medicine—Dr. Thomas S. Williamson.
26. History of the State Board of Health—Dr. Everett C. Hartley.
27. First Period of the Practice of Medicine in Minnesota—Dr. Fairchild.
28. Practice of Medicine in the Northwest—Dr. Walling.
29. Medicine in the St. Croix Valley—Dr. T. C. Clark.
30. Biography of Dr. Thomas S. Williamson—Dr. Hamilton.

"The following have been promised the Committee to be ready by the time of the Annual Meeting in June:

31. History of the State Hospitals—Mrs. B. L. LaDu.
32. History of Medicine in St. Louis County—Dr. Bardon.
33. History of Medicine in Olmsted County and the Mayo Clinic—Dr. Braasch.
34. The Committee also has compiled a list of those admitted to the State Association together with

the date and place of their graduation in medicine. In addition to the above the Committee has a number of other manuscripts and reprints relating to the history of medicine in Minnesota.

"In all the papers mentioned the narrative has been made as comprehensive as possible to the year 1900. Since that date the subject has been of necessity somewhat abbreviated.

"The Committee believes there is more than sufficient material to form a first volume."

Post Graduate Education

From the Report of the Committee on Hospitals and Medical Education, Dr. C. A. McKinlay, University of Minnesota, chairman:

"Post graduate courses before county societies have been used frequently during the past two or three years. Several factors may be involved. One of them may be that the overhead on these courses is burdensome compared to the cost when physicians are invited individually.

"Actually the percentage for overhead is very low, usually seven to ten per cent as computed by the Extension Division of the University, added to actual travelling costs of the lecturers.

"Societies will always exercise the privilege of invitation, of course, with or without attention to the expenses of the lecturer. The value of coördination of faculty and subjects through the Extension Division is apparent, however. This service is available at a very reasonable cost.

"It is also suggested that bulletins on post graduate courses be revised to include names of lecturers as well as subject matter. . . ."

Too Many Medical Students

From the Report of the Committee on University Relations, Dr. F. J. Savage of St. Paul, Chairman:

The following interesting quotations on the problems of limitation of students in medical schools from members of medical school teaching staffs formed the basis of the report:

" 'The problem involves action on a national scale to be effective. The number we have now is 20 per cent too large for the best teaching.'

" 'Fifty per cent of the present enrollment could receive adequate instruction with present facilities and staff.'

" 'We are graduating too many men, some of whom are obviously unfit to practice medicine.'

" ' . . . An over-crowded profession means a degenerating profession. This is particularly true of medicine where opportunities of entering into related professions are almost nonexistent. The temptations ordinarily not listened to become, for some people, overwhelming in the presence of adversity. It is not good public policy to educate more doctors than the public requires. This question will doubtless receive faculty consideration in the near future.' (Dean R. E. Scammon, University of Minnesota.)

"What is the solution as far as our medical school is concerned?" the Committee asked in conclusion.

"On good authority we make the statement that, from two standpoints—the needs of the state and adequate teaching—80 admissions to the freshman class represents the desirable number. This limitation of students could be accomplished at the University of Minnesota by action of the Board of Regents.

"We, therefore, recommend to the House of Delegates of the Minnesota State Medical Association that the Secretary be instructed to transmit a copy of this report to the Board of Regents of the University of Minnesota with the request to them that they appoint a committee to investigate the statements made in this report and that, if the statements are found to be true, they take prompt action to curtail the ever increasing output of physicians and thereby maintain the standards of the medical profession."

Committee Will be Appointed

The Reference Committee, of which Dr. J. C. Hultkrans of St. Paul was chairman, recommended the adoption of this report in its entirety including its final recommendation.

A committee of the Council accordingly will be appointed to take the matter up with the Board of Regents.

For More Reserve Officers

From the Report of the Committee on Military Affairs, Dr. F. L. Smith, Rochester, chairman:

"In view of the fact that the R.O.T.C. medical units have been discontinued by act of Congress, the only means of maintaining the reserve medical quota lies in the effort of the State Association to contact young physicians who are physically qualified and interest them sufficiently to apply for commission.

"The Corps Area Surgeon states that his office will be sorely taxed to supply the authorized increase of CCC camps in this Corps with reserve officers. . . . In order to maintain the present standards of efficiency of the medical personnel of CCC organizations, the Corps Surgeon prefers to appoint from the Reserve lists as he has first hand knowledge of their qualifications.

"This work which the government is fostering gives an excellent opportunity for the young graduate to become acquainted with routine duties and develop initiative in performing the duties of a medical officer. It also offers a lucrative income for those without funds to help them to establish themselves in the practice of their profession."

Malpractice Suits

From Dr. B. J. Branton, Willmar, member of the Committee on Medical Economics, reporting on a study of malpractice cases made for his committee and the Council:

"1. There has been a marked increase in the number of malpractice cases brought during the last five years and the size of the verdicts obtained against medical men.

"2. Only a small percentage (one per cent) of those brought are justifiable.

"3. Less than 5 per cent of the lawyers in the state will bring such a case against a doctor. But this percentage embraces some of the most aggressive members of the legal profession.

"4. Because of the above conditions, many of the insurance companies issuing physicians' malpractice liability insurance hesitate to assume this coverage and have markedly increased such insurance in the state.

"Therefore we recommend that a committee on legal defense be formed consisting of three members: one to be appointed by the president of the State Association, one to be appointed from the members of the Council, one to be a lawyer, preferably the legal representative of the State Board of Medical Examiners, his appointment to be made by the Council of the State Association. This committee to meet once a month at stated times or at the call of the chairman to discuss each new case brought in the state against a member of the association; to give advice and assistance, if requested, in the conduct of the case."

The Council will study the details of the establishment of a subcommittee of the Medical Economics Committee, following the recommendation of the Reference Committee and the House of Delegates and subject to budget adjustments of the Finance Committee of the Council.

Affiliate Membership

The perennial question of affiliate membership—shall the age limit be extended, lowered or removed?—will be settled once for all if the amendment accepted by the House of Delegates for publication and final action next year is finally added to the Constitution and By-Laws of the Association.

By this amendment, the age qualification will be entirely removed from the consideration of fitness for affiliate membership.

Following is the amendment as presented to the House.

Proposed Amendment

"Section 4. Affiliate members shall be those members of component medical societies:

1. Who through disabilities are unable to engage in the practice of medicine.
2. Who have retired from the practice of medicine.

   Provided, however, that such member, in either class, shall have first, upon his own request, been declared an affiliate member of such component society at its regular meeting, such action having been approved by the Council, and provided, further, that such affiliate membership shall automatically cease and revert to its previous status upon termination of the disability or upon resumption of practice."

It was suggested by the Delegates that a clause be inserted to make it clear that the amendment was not designed to be retroactive and that members already declared affiliate, with approval of the Council, would not lose their present status.

Health Insurance

The delegates went on record once more as standing united behind the House of Delegates of the American Medical Association in its opposition to compulsory contributory health insurance in America.

The resolution in which its attitude is again vigorously stated is printed below. Also a resolution of commendation to some of the major news services of the country for the marked rise that has been noted in the standards of reporting in the field of legitimate medicine.

On Health Insurance

Whereas, due to certain irresponsible and unjustified declarations made in the past by members of subsidiary scientific societies, an impression has been created in some quarters that organized medicine as a whole does not support the House of Delegates of the American Medical Association in its stand against compulsory, contributory health insurance, and

Whereas, this is the first great state medical meeting to be held following the vigorous restatement of its stand made by the American Medical Association at Atlantic City, and

Whereas, the Minnesota State Medical Association and also the great majority of practicing physicians of the United States present a united front, in fact, in its unalterable opposition to any scheme for compulsory health insurance, regarding it as unfair, in America and seriously affecting the progress of medicine and the standards of medical care, Be it therefore

Resolved, that the House of Delegates of the Minnesota State Medical Association go on record again as definitely supporting the House of Delegates and the Board of Trustees of the American Medical Association in its stand against compulsory, contributory health insurance, and be it further

Resolved, that it commends the American Medical Association for its enterprise in giving assistance and encouragement to experiments controlled by county and state medical societies in new plans for distribution of medical care for low income classes and the indigent, and be it further

Resolved, that it go on record as approving that type of experimentation in Minnesota wherever it seems necessary.

On Reporting

Whereas, within the memory of many members of this society, quack remedies and quack practitioners occupied prominent positions in the advertising and news columns of virtually all the newspapers of America and accurate reporting of scientific medicine's advances was almost unknown, and

Whereas, within recent years fraudulent advertising of this character has been largely eliminated, no doubt at heavy loss in revenue to the newspapers, and simultaneously a marked rise has been noted in the standards of reporting in the field of legitimate medicine so that today in Minnesota and most generally throughout the country it is obvious that the health of the people and the forward march of medical science has become most important news.

Now, therefore, be it

Resolved: That the Minnesota State Medical Society, in House of Delegates assembled, express its sincere commendation of this greatly enlightened attitude of the newspapers and the press services generally, noting with especial approval the accurate and full reporting of medical matters by the science service of the Associated Press and the Scripps endowed "Science Service."

The Council Meets

Four prolonged sessions marked the deliberations of the Council in the course of the three day annual meeting at Minneapolis and the Sunday preceding.

Much time was consumed in essential discussion of the grave problems before the medical profession of Minnesota today. Action, in most instances, was deferred for further study by special committees of the Council.

For instance:

What definite machinery will be set up to work with Dr. A. J. Chesley and the State Department of Health in the conduct of the public health program contemplated in the Social Security Acts waits final action of Washington and further study by the Council.

How the association will profit by the comprehensive report upon the malpractice litigation situation made for the Council by Dr. B. J. Branton of Willmar will be determined at the fall meeting of the Council.

What is to be the policy and function of the association with regard to the newly announced Works Progress Administration which proposes to eliminate for all employable persons any direct payment of medical bills out of relief funds, also awaits further information from SERA headquarters and further conferences between the physicians and SERA officials.

Legislative Chairman

Dr. L. L. Sogge of Windom was appointed chairman of the Committee on Public Policy and Legislation by President W. A. Coventry to fill out the unexpired term of the late Dr. H. M. Johnson, with the approval of the Council.

At the instance of the Council, Dr. Sogge called the members of his committee together immediately in order that they might be prepared to report in the fall on the future policy of the committee.

New Budget

A new budget for Association expenditures is under contemplation by the Finance Committee of the Council, Dr. H. Z. Giffin, Rochester, chairman, told the Council.

To that end, a thorough study of all the activities of the organization is under way. All new proposals involving major expenditures of funds were therefore referred to this committee for study, and action postponed until the fall meeting of the Council.

History

The work of the Historical Committee on the Association's history in Minnesota is nearly completed.

Dr. John M. Armstrong of St. Paul, who succeeds Dr. A. S. Hamilton, unable to serve as chairman because of illness, officially conveyed this information to the Council.

The committee was empowered by the Council to finish compilation of manuscripts for printing and to submit it to publishers for estimates of costs.

New Society

The new Dakota County Medical Society will receive its charter with seven names of charter members inscribed, by direction of the Council following appropriate action of the House of Delegates.

Thus the thirty-fourth component medical society joins organized medicine in Minnesota.

Committee Discontinued

At the suggestion of Dr. W. F. Braasch, chairman of the Committee on Medical Economics, the sub-committee of that body to study the limitation of the number of physicians to be licensed in Minnesota was discontinued.

The work of this sub-committee has been assumed by the Committee on University Relations, of which Dr. Frank Savage of St. Paul is chairman.

"D.P.H."

The degree, "Doctor of Public Health," is not recognized by law in Minnesota, F. Manley Brist, attorney for the association, told the Council.

Public health officials who lay claim to the degree and the title do not acquire, on that account, any right to practice medicine in any form in the state.

OF GENERAL INTEREST

Dr. B. H. Haynes, formerly of Lewisville, Minnesota, is now located at Blue Earth, where he opened offices, June 15.

* * *

Dr. E. M. Sorenson, formerly of Round Lake, Minnesota, has become associated with the Bratrud Clinic, Thief River Falls, Minnesota.

* * *

Dr. W. M. Youngerman has left Rochester, Minnesota, and has been associated with the Christie Clinic, Champaign, Illinois, since July 1.

* * *

Dr. J. S. Shrader, formerly of Hollandale, Minnesota, has purchased the practice of Dr. H. A. Schneider at Jordan, Minnesota. Dr. Schneider is now located at Owatonna.

* * *

Dr. Robert E. Rock, Saint Paul, for several years with the State Board of Health, was married, June 18, 1935, to Miss Beryl Canfield, Minneapolis. Dr. and Mrs. Rock will make their home in Minneapolis.

* * *

Drs. W. J. and C. H. Mayo were awarded the honorary degree of Doctor of Laws at the commencement exercises of the University of Minnesota, June 17. The diplomas, each bearing the names of both brothers, were inscribed as follows:

"Honored and respected wherever thought is given to Medical Science, recognized as outstanding figures in an era of unparalleled scientific advancement, founders of a great institution for medical research, unceasing advocates in behalf of better education, known to the world and neighbors alike as Brothers William and Charles, inseparable; on them the Regents of the University of Minnesota, on recommendation of the faculties, confer the degree of Doctor of Laws honoris causa with all of the rights and privileges belonging to that degree."

Meningococcus Antitoxin

The Council on Pharmacy and Chemistry reports that a review of recent studies has convinced it that meningococcus antitoxin shows a promise that makes it worthy of more extended clinical trial; the evidence, however, not being sufficient to warrant unlimited acceptance, the Council voted to accept the product submitted by Parke, Davis & Co. for one year only, in the hope that this acceptance may result in a clearer evaluation of its usefulness. At the end of that period the Council will give the product further consideration. (*Jour. A. M. A.*, March 23, 1935, p. 1007.)

PROCEEDINGS *of the* MINNESOTA ACADEMY OF MEDICINE

Meeting of May 8, 1935

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club, on Wednesday evening, May 8, 1935. The president, Dr. A. R. Hall, called the meting to order at 8 p. m. There were fifty-eight members present.

Minutes of the April meeting were read and approved.

Upon ballot, Dr. Louis A. Buie, of Rochester, was elected a candidate for associate membership.

Dr. J. F. Corbett read the following memorial to Dr. Arthur T. Mann, and a motion was carried that this be placed in the permanent records of the Academy and a copy sent to Dr. Mann's family.

Dr. Arthur Teall Mann was born in New York City in 1866, and died on April 15, 1935. His father, Samuel Rexford Mann, was a man of considerable wealth and it is of interest to know that the father, being free to do what he liked, as an avocation, became an artist and produced some worthy pictures. Dr. Mann's mother, Georgiana Teall Mann, was a woman of strong personality and possessed the ability to develop something worth while in her children, of whom there were four, and, what is more important, to cause them to develop themselves.

An old grey stone house in New York on 24th street, still standing and today furnishing evidence of its pristine attractivenes, was the home where the family was raised until the death of the father. About 1876 the family went to Rochester, New York, and a little later at the solicitation of Judge Teall removed to Eau Claire. On account of the reputation the University of Minnesota had achieved, Mrs. Mann took her family to Minneapolis in the early eighties. Arthur T. Mann entered the University and received his B.S. degree in 1888. He helped organize the first football team at the University and played on the team. He also played baseball and it was said he never muffed a fly in three years. In addition, as a boy, he loved to sail a boat.

After leaving Minnesota he entered Harvard Medical School and was graduated *cum laude* in 1896. He served as an intern at Channing Hospital, Brookline, Mass., from 1895 to 1896. From 1896 to 1898 he was house surgeon at Boston City Hospital and continued his medical training as resident at Massachusetts State Hospital from 1898 to 1899. He took postgraduate work in Boston in 1902 and abroad in 1904. He again visited medical centers of Europe in 1914.

After this long training he returned to Minneapolis to practice his profession and served as Assistant in Surgery at the University of Minnesota Medical School from 1899 to 1902. He was instructor from 1902 to 1906; Clinical Professor to 1913; and, from that date, Associate Professor of Surgery to the present time.

He was Chief of Surgical Service at the Minneapolis General Hospital from 1913 to 1922. On that date he relinquished active service to go on the Consulting Staff. He also served on the surgical staff of Northwestern Hospital and Abbott Hospital for a long period of time. He was Surgical Consultant in U. S. Public Health Service from 1919 to 1923, when he did an enormous amount of surgical work on the returned soldiers.

In 1918 to 1919 he served as a Major in the Medical Corps of the U. S. Army, and as Chief Surgeon at Camp Dodge, Iowa.

He was a member of the Hennepin County Society, the Minnesota State Medical Association, a Fellow of the A.M.A., Fellow of the Western Surgical Society, Fellow of the American College of Surgeons, a member of the Minnesota Pathological Society, past-president and member of the Minneapolis Surgical Society, and member (since 1903) of the Minnesota Academy of Medicine. His services as Secretary-Treasurer for 16 years and later as President of Western Surgical Society are remembered by a widely distributed group of surgeons. He served as a Governor of the American College of Surgeons.

In 1904 he married Miss Winona Orff, and at the time of his death they resided at 2437 Park Avenue.

He was a member of the Minneapolis Club, the Woodhill Country Club and the Lafayette Club. He was a golf player and especially enjoyed a game of chess. He particularly excelled at chess and during these games the thoroughness and generosity of his character was revealed in a striking manner. He knew the game, but if his opponent started a false move he would caution him to go slowly.

Probably on account of his English ancestry, he was reserved, self-possessed, determined to carry out his always laudable purposes, courageous to follow his logical way of thinking, confident of his conclusions. He hated exploitation and sham, and aimed to see both medical and other conditions as they really were.

He attended the Presbyterian Church and his conscientious performance of all he did is a tribute to his religion.

As a practitioner of his profession, he showed all of the characteristics that have been enumerated in the analysis of his personality. He had been thoroughly grounded in his profession and often from the fundamental facts could develop application to his work that appealed to one who followed his logic based on sound premises.

He was versatile in the range of his work and in a widely spread field showed evidence of thorough grounding and ability to meet new and unsolved problems. His contributions to literature cover many fields of effort. A partial list of these is appended. The rise and development of the Western Surgical Society s probably due in a large measure to his efforts for hat organization.

The Minnesota Academy of Medicine mourns the loss f Dr. Mann as a member.

His memory endures. The influence of his sturdy eliance, his integrity and honesty of purpose, mani-ested by intense application to whatever the task might demand, will inspire our members as long as memory endures.

Signed by the Committee:

Harry P. Ritchie,
Horace Newhart,
J. F. Corbett, *Chairman.*

BIBLIOGRAPHY OF WRITINGS OF DR. A. T. MANN

Compiled April 25, 1935

Some Complications of Strangulated Hernia, with cases. Northwestern Lancet, 23:437-40, 1903.
Fractures of the Lower Jaw. (Inaugural Thesis, Academy of Medicine.) Northwestern Lancet, 24:21-29, 1904.
The Surgical Treatment of Pancreatitis. Northwestern Lancet, 24:453-55, 1904.
The Manufacture and Use of Tin Splints; with some special appliances. Jour. A.M.A., 44:1520-23, 1905.
Rapid Healing in Septic Cases, including the use of Iodoform Wax in Bone Cases. Jour. Minn. Med. Assn., 26:229-32, 1906. Also N. Y. Med. Jour., 82:168-71, 1905.
Empyema. Surg., Gyn. & Obst., 5:345-9, 1907.
Cases of Appendicitis Illustrating Some Common Mistakes in Diagnosis. Jour. Minn. Med. Assn., 27:207-13, 1907.
Ulcer of the Stomach and Duodenum. Jour. of Minn. Med. Assn., 29:458-61, 1909.
The Report of a Case of Gall Stones with Some Special Complications. St. Paul Med. Jour., 13:221-28, 1911. Abstract: Deutsche med. Wochenschr., 37:521, 1911.
Abdominal Pain, together with Some Aspects Relating to Diagnosis. Journal Lancet, 32:147-51, 1912.
The Free Transplantation of Fascia Lata in the Repair of Ventral and Inguinal Hernia, with cases. Ann. Surg., 60:481-4, 1914.
A Rubber Tube in the Reconstruction of an Obliterated Bile Duct. Surg., Gyn. & Obst., 18:326-29, 1914. Also Journal Lancet, 34:241-4, 1914.
Splenectomy for Pernicious Anemia. Journal Lancet, 35:294, 1915.
Goiter. Journal Lancet, 36:703, 1916.
Nails and Screws in Joint Surfaces. Surg., Gyn. & Obst., 23:550, 1916.
Nails and Screws in Fractures. Jour. A. M. A., 67:1148, 1916.
Difficult Herniæ. Journal Lancet, 37:331, 1917.
Empyema, Founded upon Some Army Experiences. Journal Lancet, 39:550, 1919.
Surgical Complications in Influenza. Journal Lancet, 39:284, 1919.
President's Address before the Western Surgical Association, Los Angeles. Journal Lancet, 41:128, 1921.
Surgical Reflex Stomach. Journal Lancet, 41:616, 1921.
Diaphragmatic Hernia. Minnesota Medicine, 6:285-90, 1923.
Chronic Gallbladder Diseases in the Young Adult (with H. S. Wilson). Jour. A. M. A., 83:981-84, 1924.
Bone Autograft in the Clavicle. Case Report. Minnesota Medicine, 14:461-70, May, 1931.
Gangrene of the Hand. Case Report. Minnesota Medicine, 14:670-75, July, 1931.
President's Address, Minneapolis Surgical Society—"A Short Address on the Passing Year." Minnesota Medicine, 14:675, July, 1931.
Hemorrhoids, including an original operation.
The Early Diagnosis of Chronic Cholecystitis before the Formation of Gall Stones.

The scientific program was as follows:

LATE RESULTS IN A CASE OF ARTHROPLASTY OF BOTH HIP JOINTS FOR PAINFUL ANKYLOSING ARTHRITIS

Dr. Arnold Schwyzer
Saint Paul

Dr. Schwyzer presented the patient whose right hip he had operated on seventeen and one-half years ago and the left hip nineteen and one-half years ago, and gave the following case report:

Mrs. F. C., a farmer's wife, had been an invalid for many years, due to an almost complete and very painful stiffness of both hips in extension and adduction. The pain had become constant and almost unbearable in the past few months. She was unable to walk and every morning her husband had to carry her downstairs and lay her on a couch that she might somewhat supervise the work of the children in the house. She was, of course, unable to sit on account of the rigidity of the hip joints. In the evening she was carried up again and thus day after day was spent in misery.

The general condition of the rather fleshy but well-built person was reasonably good, though the pain had caused marked lines in her face. She was despondent and readily cried. It was evident that she was, however, not of the complaining kind and that her physical resistance, including her heart, had suffered.

The outer configuration of the hips was not particularly abnormal. The legs were in extension and adduction with outward rotation. The right knee was held crossing the other in front. The *left* hip was the most painful. There was practically no rotation in this joint, no abduction at all, but apparently a few inches of flexion forward. The *right* hip joint had a just barely noticeable rotation, about 15 degrees at best. Anterior elevation of the foot from the bed on this side was about 12 inches. Abduction none. This forward motion made it possible for her to take some small steps when well supported. However, this effort was very painful.

The left hip being the most fixed and the most painful, we decided to operate upon this side first, which was done on December 7, 1915. A large flap with base upward was formed over the trochanter and from its middle a vertical straight downward incision enlarged the wound. With a Gigli saw the greater trochanter was divided and with the tendinous insertions was lifted upward. A large amount of ossified tissue in the capsule and along the edges of the acetabulum was removed, the joint was opened freely, and the head trimmed into shape to move freely in the socket. Repeated dislocation and reduction was executed until the hindrances to free motion were well located and removed. Then a portion of the gluteus minimus and medius with some connective tissue was formed into a pedicled flap and turned into the acetabulum after the head had been widely dislocated and the posterior parts of the capsule had been well brought to view for trimming by forced outward rotation of the dislocated femur. The flap overlapped the acetabular edge where the capsule had been cut away and thus insured us against a re-forming of a too-tight capsule. The ileofemoral ligament was left intact as well as feasible. A sixpenny nail through the trochanter fixed the latter perfectly, and the wound was closed without drainage. The patient left the hospital on January 22, 1916.

Two years later the patient came back to the hospital. She now wanted the other leg operated upon. This was done on December 18, 1917. By December 24 she could spread the legs actively to a distance of 33 inches between the heels and passively to 38 inches. However, we had apparently been too confident with active and passive motions, and on January 5 (two and one-half weeks after the operation) we had to aspirate a hematoma which had formed. This hematoma is probably the cause of the right hip joint being somewhat less movable than the left one at the present time.

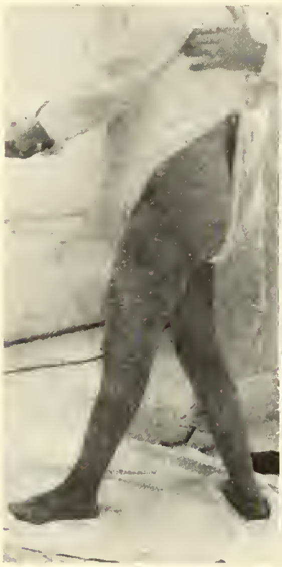


Fig. 1. Present condition nineteen and one-half years after arthroplasty for ankylosis of left hip.

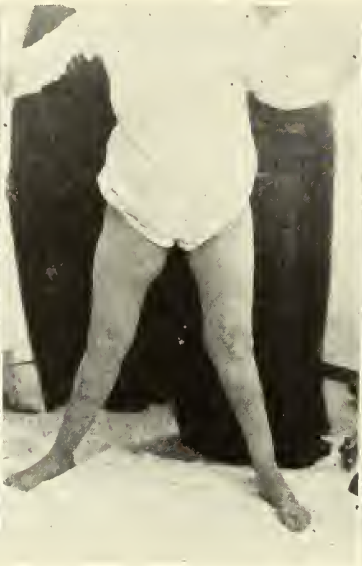


Fig. 3. Extent of painless abduction at present.

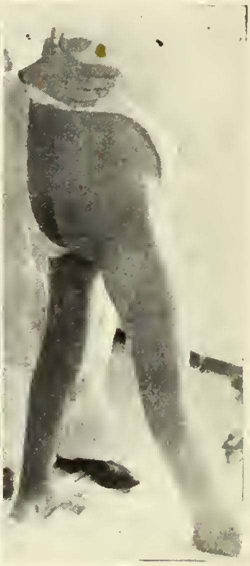


Fig. 2. Present condition seventeen and one-half years after arthoplasty of right hip.

The end-result you can read from the photographs. The patient declares that she had absolutely no pain all these years and is very emphatic about this point. Her walk is poor, and she nearly always uses a cane, but she gets upstairs alone and says she is on her feet all day long. On stepping, she can put one heel 19 inches in front of the other one, and she can spread her legs to a distance of 23 inches between the heels without any pain.

In one of the photographs you notice a varicose ulcer below the inner malleolus on the left foot. This was treated by an Unna gelatine cast. The patient is not walking so very freely, as she has become rather heavy, having gained 40 pounds.

Addendum: The interposition of a live pedunculated flap of muscle tissue (rather than fascia) had undoubtedly its main value in hindering the re-formation of the thick partly ossified lower and posterior portions of the capsule, which were the main cause of the ankylosis. The flap had its base postero-inferiorly and most probably remained muscular at the acetabular rim (at least partly) long after the flap in the acetabulum had undergone pressure atrophy.

Discussion

Dr. F. R. Wright (Minneapolis): When a man can show a patient after 20 years who was restored from a bedfast patient to one who can get around on her feet and be a useful citizen, he has really accomplished something.

Dr. Schwyzer (in closing): What Dr. Cole said about interposition of tissue is right. McAusland came out and advised the interposition of fascia some years ago. I had a case of very bad complete ankylosis of the elbow where much bone had to be removed, and there I felt it would not do to put any interposition at all. We started motion the day after operation and got a very good result with considerable mobility.

THE EVALUATION OF THE TREATMENT OF DUODENAL ULCER

Donald C. Balfour, M.D.
Rochester, Minnesota

Abstract

There probably is no chronic disease which present such great difficulty in measuring the results of treatment as does duodenal ulcer. The reason for this chiefly is that the disease manifests the widest variations, particularly in regard to character, frequency, and length of attacks. In some cases of duodenal ulcer permanent healing takes place without any treatment; in others, simple measures of treatment are required; in still others, intensive management is necessary to control the symptoms and to prevent their recurrence; yet in others, operation is required; and, finally, there are cases in which every known method of treatment fails to prevent recurrence or reactivation.

It is because of the great variability in the course of the disease and in its response to management, that it is not only impossible, but most unfair, to attempt to compare the results of medical and surgical management. Surgical results are based on those cases in which medical treatment has failed because of chronicity, the development of complications, and so forth, so that comparisons are not justifiable. I believe it is ıquestionable that medical management has become ore efficient in the past few years. This fact, together ith the likelihood that the disease is not as serious ; it was formerly, probably explains the smaller perntage of patients who apparently require surgical eatment.

In the majority of cases of duodenal ulcer the sympms or disability are not sufficient to present any difculties as to management and the patient should be ıpressed with the importance of so regulating his abits of living that chronicity of the disease can be voided. In cases of acute perforation, and in cases f chronic obstruction in which symptoms are severe r persistent, the indications for surgical operation are uite clear.

Those cases in which there may be some doubt as to ıe proper course to follow may be divided into three roups: (1) young patients whose symptoms are marked nd recur frequently, and for whom, because of their ge, medical treatment is unsatisfactory; (2) those atients who have relatively short attacks of pain, peraps a week or two of symptoms occurring only once r twice a year, and complete freedom in the intervals; 3) those patient who have the hemorrhagic type of lcer. This third group presents the most baffling probems in respect to most efficient management. Surgical ıanagement should include measures designed to give ıaximal protection against recurrence of hemorrhage.

The chief problem concerning hemorrhage is in cases f recurrent bleeding, without pain. As a rule the esion is small and does not involve the pylorus, which xplains the absence of pain. Many such lesions are cute and probably heal rapidly after hemorrhage has ccurred. Infection probably plays a prominent part nd treatment, therefore, should include thorough elimiation of foci of infection.

The indications for the various procedures present very complicated question, since the age, sex, physical ondition, personality of the patient, variability of the esion, the physiologic effect of the operation, and the kill of the surgeon, must all be taken into consideraion. The more chronic the lesion, and the more motility as been impaired, and the older the patient, the learer is the indication for gastroenterostomy. The ontraindications to gastroenterostomy are the indicaions for those procedures which include removal of he lesion of the duodenum and reconstruction of the utlet of the stomach. Partial gastrectomy should be reserved for those patients who have had such serious bleeding that thorough removal of the first segment of the duodenum is distinctly to their advantage, and for those patients who are suspected of suffering from a high liability to recurrent ulcer.

When surgical treatment is carried out on the basis outlined, the results will show that in cases of chronic duodenal ulcer, in which operation is clearly indicated, from 85 to 90 per cent of the patients can be given complete and permanent relief of symptoms and protection against recurrence of the disease.

Discussion

Dr. H. B. Zimmermann (St. Paul): I would like to ask Dr. Balfour how often he sees hemorrhages after surgical procedure such as gastroenterostomy, when probably the ulcer was not bleeding; possibly there was a gastritis and that in itself bleeds. Also, what sort of procedure he would recommend for gastritis with these duodenal ulcers? Also, what type of procedure he would use when he had done a gastroenterostomy for hemorrhage and the hemorrhage is continued? Whether he would do a simple excision or exclusion of the pylorus, or whether he would feel that subtotal gastrectomy would be the operation of choice?

Dr. Arnold Schwyzer (St. Paul): Though the subject is, as Dr. Balfour says, timeworn, I think a discussion of it coming from a man like him is very timely. We are in a quandary just now through all these publications on the subject. I am glad that the Doctor still speaks for the simpler operations first. When you see a pin-point ulcer of the duodenum treated by a surgeon resecting the best part of the stomach, it doesn't look quite logical nor quite fair. In my work I find that in gastroenterostomy in the earlier days I had rather better end-results than later, and I have tried to figure how that came about. In the earlier days I had been anxious to get a very good linear closure of the mucosa; that is, after sewing the posterior part of the mucosa I would allow the mucosa of the anterior side to bulge out and sewed practically surface to surface. I read an article written by a German who showed experimentally that when you put mucosa to mucosa with their surfaces together and sew them, they will heal together. The mucosa is thus everted instead of inverted. When the mucosa is inverted, as most all of us do now, you don't know how much space you have left between the ends and this may be the reason why in the earlier cases I seldom saw a marginal ulcer, but later on have had several. It is, as Dr. Balfour said, an easy thing to cure a marginal ulcer by simply disconnecting the gastroenterostomy. In resecting a posterior duodenal ulcer, as you saw in a number of Dr. Balfour's pictures, you cut through the wall of the duodenum. You open the duodenum, but sometimes it is possible to cut the ulcer away from the underlying tissue before opening the gut. I remember a very large gastric ulcer (about 2½ by 1½ inches in diameter) where without first opening the stomach we shaved off the pancreas, which was quite fibrous under the ulcer. We did not have to put on any ligatures because the base under the ulcer had become quite cicatricial. I think that this sometimes would make the procedure a little cleaner.

Dr. A. R. Colvin (St. Paul): I am glad Dr. Balfour paid particular attention to the question of hemorrhage. I read the editorial to which he referred in the *Journal of the American Medical Association* and the statement is made that "the average ulcer really doesn't shorten life and that surgery should largely be confined to the complications of ulcer. All that medical or surgical treatment does for ulcer is to bring about a remission of symptoms for a time." The last time Dr. Balfour spoke here on this subject of ulcer, I cited a case where gastroenterostomy had been done fourteen years before. This patient came in to see me during a period of fourteen years postoperative at least twice a year and each time she came she was more enthusiastic as to how cured she was. At the end of fourteen years she nearly bled to death. She had a remission of her symptoms but did not have a cure of her duodenal ulcer. This is in line with the suggestion of the writer of the above editorial, *i.e.*, that we do not cure ulcer.

Of course we do cure ulcer, either by surgical or medical means, because I have seen them. I have operated on stomachs and found healed ulcers, *e.g.*, hour-glass stomachs. If Dr. Balfour seems discouraged about bleeding ulcers, I don't know what we are going to do, for we look to him for a great deal of instruction as to what to do with ulcer of the duodenum. It so happens that at the present time the subject is quite urgent with me for I have three cases in Ancker Hospital. Those three cases have impressed upon me the necessity for individualizing the question of bleeding ulcer, and are cases which I would like to have Dr. Balfour help us out on.

The first one had a gastroenterostomy done at another hospital. After three years he came to Ancker Hospital with a marginal ulcer which, at operation, was found to have nearly perforated into the colon. The gastroenterostomy was undone and a jejunostomy made, by which he was fed for two months. Again he was much relieved, but was admitted within a year for massive hemorrhage. Knowing the difficulties which would be met in exposing his duodenum after his previous operations, it was felt that in his condition of extreme anemia there were more chances in trusting to a cessation of the hemorrhage. Autopsy confirmed the opinion as to the difficulties which would have been encountered, and it was found that he had a large ulcer extending into the pancreas in the base of which was an open vessel.

The second case was in a man of forty-five who also had had a gastroenterostomy at another hospital and was admitted with a marginal ulcer perforating the colon. The gastroenterostomy was undone; he remained well for a time, and then returned because of pain unrelieved by medical care. It was found that a direct attack on the ulcer would have been too formidable a procedure; so the stomach was divided about 2 inches proximal to the pylorus, the distal portion closed, and a Polya made. His pain was relieved and he left the hospital happy, but returned in four months with a massive hemorrhage. Again knowing the magnitude of any operative procedure to expose the duodenum, surgical inactivity was decided upon, and he has recovered, his hemoglobin is 85 per cent and he is free from pain. The manner of exclusion did not prevent hemorrhage but it has relieved his pain; it is improbable that his ulcer is healed.

In the third case, the patient, a man of thirty, has had two perforations of his duodenal ulcer. At the time of his second perforation he had a gastroenterostomy done. He did well for about two years and then had so much pain that a division of his stomach two inches proximal to the pylorus was done, both ends of the stomach were closed and his old gastroenterostomy opening now served as the outlet to the proximal portion. His pain was entirely relieved and he left the hospital, to return in six months blanched from a massive hemorrhage. Again the difficulty and danger of operative procedure was realized and nothing was done surgically. His hemorrhage has ceased and his hemoglobin is back to 65 per cent.

I have cited these cases in some detail, hoping that Dr. Balfour in his closing discussion will tell us, if possible, the best course to pursue. Should the two who have ceased to bleed be subjected to any further surgery?

Dr. H. P. Ritchie (St. Paul): I wonder if, in many cases, recurrence of symptoms following operation may not be explained on a mechanical basis. There was a time when there was so much debate on procedure, position on stomach, direction of the anastomosis, iso- or anti-peristaltic loop, angulation with rotation, etc. With so many technical factors to be considered, there must be cases of recurrence due to the incomplete operation. When this occurs there obtains the same conditions which produced the original lesion. I think any one doing this work can recite the history of recurrence and repeated operations, going on to a Polya before cure is effected. But I do not believe such experiences indicate the routine use of an operation more extensive than the gastroenterostomy. This operation, as so well illustrated here, is quite well standardized and I believe that Dr. Balfour's comparative statistics indicate the use of the simple procedure as a primary step in the surgical cure of duodenal ulcer.

Dr. L. C. Bacon (St. Paul): A few years back it was my privilege to spend some time with Mr. Walton in the London Hospital and, in discussing stomach difficulties of various types, one of his remarks impressed me. He said that his understanding was that the food habits and nutrition on the two sides of the Atlantic were so entirely different, that he wondered if the two peoples should not be guided in their care of these cases by their experience in their own country. It seems to me that Dr. Balfour's statistics would point rather distinctly to the type of procedure we should follow here, in the main.

Dr. Martin Nordland (Minneapolis): I enjoyed Dr. Balfour's presentation of this subject very much and in discussion I wish to emphasize a few points. First, it must be remembered that duodenal ulcer is only a local manifestation of a general physiological change and that the treatment of duodenal ulcer becomes surgical only when complications have developed. Second, when the surgeon is confronted with a complicated case of duodenal ulcer he has a certain definite responsibility. In the presence of recurrent hemorrhage he must first be certain of the source of the hemorrhage. The patient seldom dies with the first bleeding and, therefore, it is not dangerous. Following the second hemorrhage, however, the surgeon's responsibility begins. A second hemorrhage usually means that the bleeding vessel is large. When a second hemorrhage occurs, the surgeon must advise operation even though the roentgenologist reports the absence of a duodenal ulcer. The roentgenologist must not take 100 per cent of the responsibility. Emergency procedures are unound. The patient must first be put to bed on full liet and iron medication. The patient with an acute nemia is a poor surgical risk, while the individual vith a chronic anemia tolerates surgery very well. The time for surgical interference then is not determined by the degree of anemia. Further, the surgeon's esponsibility does not end with the operation and the mmediate recovery. Complicated cases of duodenal ilcer must be followed for a long period postoperatively nd the patient must be taught to coöperate. For good ostoperative results the surgeon should never operate ipon an undisciplined patient.

Dr. J. A. Johnson (Minneapolis): I enjoyed very nuch the exhaustive discussion Dr. Balfour presented n stomach surgery. The most troublesome type of ase, in my experience, is the patient with severe gastric iemorrhage who is not in condition for surgery, and ften the bleeding continues so that such patients drift nto a more and more serious condition. I have found he best thing to do in these cases is to put the stomach completely at rest. This is accomplished by introducing a nasal tube attached to a suction apparatus which keeps the stomach empty of blood and gastric secretion. If the bleeding is severe and prolonged I resort to jejunostomy for the purpose of feeding. This can be done under local anesthesia without moving the patient. The stomach is then empty and at rest and nutrition can be kept up almost indefinitely. If necessary, a blood transfusion is resorted to. I am sure this has been a life-saving procedure in a number of cases of this type.

Dr. Balfour (in closing): I appreciate this discussion and have been much interested in the case reports that have been given. They emphasize the fact that the English reports of the seriousness of hemorrhage are not overdrawn. Patients do die of hemorrhage from ulcer, and the cases described illustrate the results of operating on exsanguinated patients. Dr. Johnson's suggestion of jejunostomy is important. If we adhere to general principles and to fundamentals in management, poor results will be kept at a minimum. I fully agree with the doctor who said that the treatment of duodenal ulcer should be individualized.

Walton's statistics and the survey made by the British Medical Association* indicate that in an average of 89.5 per cent satisfactory results may be expected to follow gastroenterostomy for duodenal ulcer if such cases are followed for a period of more than four years subsequent to operation.

The questions which Dr. Zimmermann asked are most interesting. In general, I would say that gastritis, in itself, is not justification for operation. The decision as to what should be done with the patient who has had a gastroenterostomy first necessitates determining the source of the bleeding. I have missed some cases by assuming that the primary lesion was the cause of the bleeding; recurrent hemorrhages subsequently have taken place. I think that in such cases the gastroenterostomy should be taken down. Dr. Colvin's cases illustrate the problem of recurrent hemorrhage. It is probable that the bleeding was from a small superficial jejunal ulcer.

It is confusing to compare medical and surgical results, since the surgeon is asked to deal with a group in which medical treatment has failed. The efficiency of the management of duodenal ulcer depends to a large extent on selection of cases for various methods of treatment, both medical and surgical. The difficulty in establishing any rule of management is well illustrated by the result of a debate† before the Royal College of Physicians of England last year on the motion "that, in the absence of complications, surgical interference in cases of gastric and duodenal ulcer is unnecessary." After prolonged discussion, the vote on the debate ended in a tie: for the motion 70, and against the motion 73.

GRADUATE MEDICAL EDUCATION OF CERTAIN SORTS IN MINNESOTA

A Brief Abstract

Richard Olding Beard, M.D.

Emeritus Professor, University of Minnesota

(Since the author is under present engagement for the writing of treatises of a much more extended character, and much more inclusive of the history of medical education in Minnesota, than is this particular article; and since the Minnesota Academy of Medicine has invited a brief sketch—brief under its self-protective rules—he is withholding its publication until a later date and is confining himself to this still briefer extract, of which the author may avail himself under the Academy's rules.)

The first of these "certain sorts" of graduate medical teaching, to which this sketch refers, is that conducted by the Minnesota Academy itself and, in lesser degree, by other and similar organizations among their own members. It suggests the names of those Academy members who have most largely contributed to this type of education and who have passed away, leaving behind them those who, still living, are yet making the lives of their associates better for their presence.

The second of these agencies of graduate medical education in Minnesota, which it considers, is impersonated by the preceptors of other times who served their day and generation in their professional offspring and who laid the first foundations of medical education for their followers.

The third and most modern form of graduate medical education which it discusses is found in the more highly organized graduate medical school, or schools, of Minnesota which are distinguished from the undergraduate schools by their formal return to the principle and practice of individual as opposed to group teaching; and by their official award of graduate degrees to their successful students.

The meeting adjourned.

R. T. LaVake, M.D.,
Secretary.

---

*Luff, A. P.: Collective investigation into the after-history of gastroenterostomy. Brit. Jour. Surg. 2: 1074-1078, Dec. 7, 1929.

†Editorial on a Debate on the Treatment of Peptic Ulcer. Lancet, June 9, 1934, Vol. CCXXVI, 1: 1231-1232.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for August

The Minnesota State Medical Association Morning Health Service.

The Minnesota State Medical Association broadcasts weekly at 11:15 A. M. every Tuesday over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month of August will be as follows:

August 6—Getting Ready for School.

August 13—Shingles.

August 20—Diet and Health.

August 27—Carbuncles.

Minnesota State Medical Meeting

Minneapolis, June 24, 25, 26, 1935

Registration

Physicians		1,720
Minneapolis	906	
Saint Paul	321	
Rochester	42	
Duluth	65	
Rural	213	
Out of State	173	
Exhibitors		262
Nurses		313
Auxiliary		410
Unclassified		29
Total		2,734

Physicians were registered from the following states:

Arizona	1
California	3
Canada	3
Florida	3
Illinois	7
Indiana	1
Iowa	34
Kentucky	1
London, Eng.	1
Massachusets	4
Michigan	1
Montana	1
Nebraska	4
New Jersey	1
North Carolina	1
North Dakota	29
Ohio	2
Pennsylvania	1
South Carolina	1
South Dakota	26
Texas	2
Washington	2
Wisconsin	44

The above figures from out of State are included in the grand total.

The registration of the American Association for the Advancement of Science admitted members to our meeting who consequently were not registered with us. However, several hundred of them visited our exhibits, making the total attendance around 3,800.

Minnesota Radiological Society

The annual meeting of the Minnesota Radiologic Society was held in connection with the meeting the State Medical Association in Minneapolis, June 1935. Officers for the coming year were elected follows: President, Dr. Eugene Leddy, Rocheste vice president, Dr. J. Richard Aurelius, St. Pau secretary-treasurer, Dr. Leo G. Rigler, Minneapolis.

Northern Minnesota Medical Association

OFFICERS

President—G. I. Badeaux, M.D., Brainerd, Minn.

Vice President—A. C. Collins, M.D., Duluth, Min

Sec'y-Treas.—O. O. Larsen, M.D., Detroit Lake Minn.

The annual meeting of the Northern Minnesota Me ical Association will be held at Duluth, August and 13, 1935. Headquarters will be at the Hot Duluth.

Monday, August 12, will be devoted to the present tion of scientific papers at morning, afternoon and ev ning sessions.

Tuesday, August 13, at 9 a. m., members and gues will board the steamer Noronic for a trip up tl North Shore of Lake Superior, returning at 2:00 p. Five-course dinner.

Tuesday's program on the boat will include Dr. Pre ton Bradley, Pastor of People's Church, Chicago, ar President of the National Izaak Walton League, chief speaker.

Scott-Carver Counties

The Scott-Carver Counties Medical Society met Arlington, Minnesota, July 9, with dinner at the Hot Arlington at 7:30 o'clock.

The program, presented by two Minneapolis ph sicians, was as follows:

Dermatitis Therapy—H. G. Irvine, M.D., Minneapoli

Eye, Ear, Nose and Throat Topics—E. A. Loomi M.D., Minneapolis.

Southern Minnesota Medical Association

The Southern Minesota Medical Association wi meet at Austin, Minnesota, under the presidency Dr. S. A. Slater, August 25 and 26, 1935.

Sunday afternoon there will be an informal ge together at the Austin Country Club. Anyone wisl ing to play golf will have that opportunity. A buff supper will be served at the Club at six o'clock, an at eight o'clock there will be a meeting at the Hig School to which the physicians and their families an friends as well as the general public are invited as th guests of the Mower County Medical Society and th Southern Minesota Medical Association. This mee ing will be addressed by Dr. Morris Fishbein. H subject will be of interest to the physicians and the lay friends.

The meeting proper will open at eight o'clock nday morning with a medical and surgical Clinic the Mower County physicians. During the morn- session there will be group meetings at which time ious phases of medicine, including cardiac disease, eases of the stomach, contagious diseases of chil- n, mastoid infections and their treatment, arthritis, static hypertrophy, and so forth, will be discussed. luncheon and business meeting will be held at noon a formal program in the afternoon. On account the general widespread interest in the glands of ernal secretion, this subject will hold a prominent ce on the program. The banquet will be held in the ning at the Austin Country Club.

H. C. Habein,
Secretary-Treasurer

Wabasha County

The sixty-seventh annual meeting of the Wabasha unty Medical Society was held at Old Frontenac Thursday, July 11, 1935.

At the business session in the afternoon, the fol- ving officers were elected for the coming year:

President, Dr. C. G. Ochsner, Wabasha; vice pres- nt, Dr. B. A. Flesche, Lake City; secretary-treas- er, Dr. W. F. Wilson, Lake City; delegate to State sociation, Dr. E. C. Bayley, Lake City; alternate, . R. H. Frost, Wabasha; censor for three years, . D. S. Fleischhauer, Wabasha; censors holding over, . J. A. Slocumb, Plainview, and Dr. W. J. Coch- ne, Lake City.

Upon invitation of Doctor Slocumb, it was voted hold the next annual meeting at Plainview.

A six o'clock dinner was served to those attending, Frontenac Inn, through the courtesy of Dr. and rs. Radabaugh of Hastings.

Following the dinner, special entertainment was pro- led for the ladies, and the scientific program was esented as follows:

esident's Address—Case Report
"Fecal Impaction Following Cholecystitis"
Rudolph C. Radabaugh, M.D., Hastings
reech Presentation"..Alfred Belitz, M.D., Pepin, Wis.
njection Method Versus Open Treatment of
Hernia"........George A. Earl, M.D., Saint Paul
Diagnosis and Office Treatment of Diseases of
the Rectum"..Harold E. Hullsiek, M.D., Saint Paul
A Summary of the Present Knowledge of the
Hormones of the Anterior Lobe of the Pitu-
itary Gland"........Edward H. Rynearson, M.D.,
Mayo Clinic, Rochester.

There were twenty-six in attendance: Fifteen med- al men, three affiliated dentists, and eight ladies in the milies of doctors attending. A special vote of thanks as extended to the guest speakers for their instructive lks, and to Dr. and Mrs. Radabaugh for providing is enjoyable occasion.

W. F. Wilson, *Secretary.*

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

Emotions and Bodily Changes. H. Flanders Dunbar, M.D., Ph.D., Departments of Medicine and Psychiatry, Columbia University. 595 pages. Price, cloth, $5.00. New York: Columbia University Press, 1935.

The Principles and Practice of Medicine. The late Sir William Osler, B.T., M.D., F.R.S. Twelfth Edition, revision by Thomas McCrae, M.D., Fellow Royal College of Physicians, London, etc. 1196 pages. Illus. Price, cloth, $8.50. New York: D. Appleton-Century Co., 1935.

Objective and Experimental Psychiatry. D. Ewen Cameron, M.B., Ch.B. (Glas.), D.P.M. (Lond.). Physician in Charge Reception Service, Provincial Mental Hospital, Brandon, Man., etc. 271 pages. Price, cloth, $3.00. New York: The MacMillan Co., 1935.

Arthritis and Rheumatoid Conditions. Ralph Pemberton, M.S., M.D., F.A.C.P. Professor of Medicine in Graduate School of Medicine, Univ. of Pennsylvania, etc. 455 pages. Illus. Price, cloth, $5.50. Philadelphia: Lea & Febiger, 1935.

ANNUAL REPRINTS OF THE REPORTS OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION FOR 1934, WITH THE COMMENTS THAT HAVE APPEARED IN THE JOURNAL. Cloth. Price, $1. Pp. 135. Chicago: American Medical Association, 1934.

Each succeeding volume of reports of the Council reveals more of the long and successful fight in the interest of rational therapeutics. The Council is no longer chiefly concerned with noisome proprietaries and yet this latest volume contains reports on such articles as "Vita-Cell," a secret preparation marketed with exaggerated claims, and "Raylos," a shotgun preparation marketed in a way to promote its ill advised use by the public. Most of the "unacceptable" reports in this volume are concerned with products that may have some merit but are not offered to the public in a way which experience has taught the Council is necessary before a therapeutic agent is acceptable. Such products are Iodine Dusting Powder (Sulzberger), rejected for lack of clinical evidence of its advantage over one of its constituents; Pernoston, rejected because of lack of clinical evidence to justify routine intravenous injection of barbital compounds; Di-Hydranol, a claimed bactericidal agent proposed for use as an "intestinal antiseptic," a claim not supported by sufficient clinical evidence; and Squibb Adex Tablets, a product containing a concentrate of vitamins A and D, for which the firm could not agree to adopt a more informative name.

To those who have followed the Council's investigation of B. acidophilus therapy, the report "Acidophilus Bacillus Liquid-Mulford and Mulford Acidophilus Bacillus Block Omitted from N. N. R." will be of interest. The Council has apparently not yet reached an ultimate conclusion concerning acidophilus therapy, but it has for years held that no product could be expected to be of value unless it could show at least one hundred million viable B. acidophilus organisms at the "date of expiration." Competent bacteriologic examination showed that the two preparations here reported were inferior to this standard. Further grounds for omission were the failure of the manufacturer to comply with certain stipulations in regard to labels and advertising. Another noteworthy omission is that of Alpha-Naphco and its dosage forms, omitted because the Council on reconsideration found that it is a weak antiseptic.

The Council also issues preliminary reports, which define the status of new preparations for which the evidence is not yet sufficient to justify their presentation to the medical profession generally. Preliminary reports do not imply rejection but rather postponement of consideration until more evidence is reported by competent investigators. These reports are the outposts of therapeutic progress and as such are valuable sources of information to physicians. In this volume there are preliminary reports on Adrenal Cortex Extract, concerned mostly with scientific terminology, Cysteine Hydrochloride, Dihydroxy-Anthranol (Anthralin), Gastric Mucin, Hemoprotein (Brooks), Phenylmercuric Nitrate and Phenylmercuric Chloride.

Illustrative of the Council's efforts to keep those concerned informed of the basis for its actions are the "Recent Revisions or Elaborations of the Council's Rules of Interest to Manufacturers and the Medical Profession," which have appeared in the last two volumes. These inform the profession of the various problems which arise and the care given to their consideration. To be commended also is the "Report on Sterility of Ampule Preparations."

TUBERCULOSIS. A book for the patient. Fred G. Holmes, M.D., Director of the National Tuberculosis Association. 312 pages. Price, $2.00. New York: D. Appleton-Century Co., 1935.

To the patient who is suffering from a chronic illness, there are many questions confronting him which usually go unanswered. This is perhaps chiefly manifested in one who has tuberculosis. His physician usually has little time to answer more than a few of them. In this book, the author succeeds in answering almost any problem that might arise. He discusses with the patient the various stages of tuberculosis and the purposes of the treatment prescribed. He impresses upon the individual the importance of various measures which are necessary in successful treatment. He makes this discussion more easily understood by dividing the subject under two heads; the first dealing with the patient who requires no surgical procedure and the second the treatment required when the usual procedures are unsuccessful. This is handled very well and in a manner that can be understood by the average individual. Technical terms are avoided as much as possible, and, when they are used, the accompanying definition simplifies them.

The chapter on patent medicine is very appropriate. The author confines to the last chapter a discussion on medical ethics. He tells the patient why certain practices should be avoided in dealing with consultants, etc.

In general the book is very interesting and should be of considerable value, not only to the patient, but also to any physician.

Joseph M. Ryan, M.D.

MORE NOSTRUMS IN RETROSPECT

The chief work of the Bureau of Investigation lies in answering the thousands of letters that are received every year from physicians and laymen asking for information on "patent medicines" and quacks. The following "patent medicines," concerning which longer articles have been published previously, are among those about which the Bureau receives a large number of inquiries: *Absorbine, Jr.,* which, according to the analysis made in the A.M.A. Chemical Laboratory, was a clear, bright green liquid having a strong, penetrating, mint-like odor and seemed to be an acetone extract of some plant, probably wormwood, with the possible addition of some oil of sassafras and oil of menthol. *Alka-Seltzer,* which was reported to be essentially aspirin together with salicylic acid, citric acid and baking soda. *Bromo-Seltzer,* an average dose of which—a teaspoonful, weighing about 76 grains—was reported to contain potassium bromide, 7 grains, acetanilid, 3 grains, and caffeine, 0.8 grain. The *Converse Treatment for Epilepsy* was reported to be one of the bromide mixtures and a person taking the stuff in accordance with the directions would get an amount of bromide equal to 58 grains of potassium bromide daily. *The Hayes Asthma Treatment,* consisting mainly in the administration of iodides, together with a cough remedy, some iron and quinine, with, of course, the inevitable laxative. *Hunter's Epilepsy Treatment,* according to the analysis made by the Chemical Laboratory of the American Medical Association, was about one-fourth phenobarbital (luminal) and three-fourths milk sugar! *Dexo,* another alleged remedy for epilepsy, was reported to be a bromide mixture. *Lane's Asthma Treatment,* each dose of which was reported to contain approximately 2½ grains of calcium iodide, giving a daily dosage equivalent to 11.3 grains of potassium iodide. *Tums,* reported to be apparently nothing more marvelous than sugar and chalk flavored with peppermint. (J.A.M.A. June 8, 1935, p. 2114.)

MINNESOTA MEDICINE

urnal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota
Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society.

olume 18 SEPTEMBER, 1935 Number 9

THE COMMUNITY VERSUS TUBERCULOSIS*

Some Phases of the Campaign

DAVID A. STEWART, M.D., LL.D.

Ninette, Manitoba

EVEN fifty years ago community health as a result of community planning was a comaratively new idea. Health departments were ew fads of a few governments. They were ven back offices and a trifle of spending money, nd thought of as a kind of special police, postg diphtheria placards and prosecuting owners f nasty back yards. Now they are toxoiding hildren to prevent disease and have hitched their agons to the star of Pasteur—all germ disease anishable from the earth, therefore all germ iseases to be banished from the earth.

It was when Public Health was in the poor ack street that intelligent good citizenship aked up one morning to find tuberculosis, an bandoned waif, crying on its doorstep. Nowdays we know that this is after all a legitimate hild of official Public Health, but at that time, ith all the other hungry mouths to feed, nothing ould be done for this one that promised to be a astidious and costly child, and hard to bring up.

So Mr. and Mrs. Good Citizenship took in the aif and in all these years have done remarkbly well by it. Private effort, private money, rivate enthusiasm have been poured into this ause. It has got itself into the head, the heart nd the imagination of the public as no wholly tate-devised or municipally-supported cause ever ould. Now that its parentage is pretty well cknowledged, and its parents have become beter off, the prodigal has returned many times o official Public Health, asking for many fatted alves, and with not a little grouching of jealous lder brothers.

But after all it was fortunate for all concerned that the waif fell into the lap of the generous public. It introduced the rest of the Public Health family to the foster parents. Every dollar spent against tuberculosis has been a double dollar, giving full value in anti-tuberculosis betterment, and full value besides in general health betterment—in clean mouths, clean bodies, clean houses, clean factories, clean streets, clean foods, clean milk, tuberculin testing of cattle, pasteurization, all advertised and stimulated by the tuberculosis campaign. Most valuable of all have been the open window, the marvelous uses of rest in disease prevention and cure, the fatefulness of conservation or waste in work and play. These are all older than Hippocrates, but in our own day they all had to be newly discovered and in our own day they are very largely internal secretions formed in the special organs of anti-tuberculosis work and thrown most usefully into the general circulation of medical science and into general ways of life and living.

About one thing there is no doubt whatever. Anti-tuberculosis effort is grown-up enough, old enough, wise enough, broad enough, important enough, separate enough and specialized enough, and enough of a going concern to have its own house, its own place of business and its own independence. The tendency which broke out in the East, to put anti-tuberculosis again under guardianship of Public Health may be logical, but, like many other logical things, is wrong, and a turning back of the clock. It may come when tuberculosis is just about finished, but that won't bother our generation.

---

*Presented before the Trudeau Society at the Curtis Hotel, inneapolis, January 26, 1935.

General Principles

In every area we are covering, whether by the patchwork quilt kind of covering that I know best, or any other kind, there are at least two principles that are absolutely essential. The first might be called Central Bookkeeping, getting central agency records of every focus, every death, every case, every contact, every suspect, every clue. The second is Central Responsibility—responsibility of the Central Agency for getting the right thing done with every focus, every case, every contact, every suspect, every clue. If we have these two, all things can be added unto them.

A plan, whatever it may be, is merely a tool, like a spade or a sickle, which needs some person at the business end of it. A plan is not an automatic robot. And a plan is not a golden calf to set up and idolatrously worshipped. I am always half suspicious of the modern phrase "set-up" for fear we should bow down before the "set-up."

The only way to do work is to do it, and a man out all day with a spade will have turned over more earth by evening than a committee that has held discussions all the livelong day about the trituration of the soil.

The Travelling Clinic

If we are to speak about tools I will have to report that up in sparsely-settled Canada we find the need of travelling clinics, and that the nine provinces have evolved nine different varieties of such clinics. The essential fact is that we don't expect the contacts or suspects to find themselves or to come to us; we find *them* and go to *them*. In Manitoba half our small population is at one urban center. In the rural half and the hinterlands our clinics examine one person in seventy or eighty each year. The associated clinics of Greater New York examine one in 140 each year, just about half as many.

The Clinics are not publicly advertised, for the general curious public is not wanted. Lists of people who should be seen are suggested from the Central Bookkeeping records already mentioned. These are discussed fully with the local doctors, and added to, and the "invitations" taken or sent out by the Public Health nurses are all signed by local doctors. Reports are sent back to the doctors, and by them are given out, usually in an interview, not in writing, to the persons concerned. This brings each person examined into touch with his local doctor. A report with certain "ifs" and "buts" that would be hard to write for people of doubtful intelligence the doctor can put over in an interview.

So the doctor sends the people for examination; he gives them their reports, watches any who need watching, and is the local "agent" throughout the year. The Clinics are planned to be, and are, consultations with the local doctors. The scattered Public Health nurses are in touch with the people of all the Clinics also, though they are now so few that anything like adequate supervision cannot be given.

Excluding the services of Public Health nurses, but including all other costs of personnel and material, including films and processing, the average cost per person examined during the year has been as low as $1.27 and usually below $1.60.

The Clinics find tonsils, adenoids, teeth and many other things the people should have brought to the local doctor, but have not. He is usually a busy man for the next week or two. The Clinics bring many people to the doctor, tuberculous and non-tuberculous, who were not in touch with him but who need to be.

The work cannot be perfect. Examinations have to be hurried, but a good x-ray plate is the best safeguard against mistakes. Sometimes the most suspected family fails to come, and must be angled for diplomatically, or, if on any public relief, perhaps pushed in by provincial authority.

To Pay or Not to Pay

To pay or not to pay, that is always a vexing question. I have the general direction of three agencies for examination, the Sanatorium at Ninette, the Central Tuberculosis Clinic, and general clearing house in Winnipeg, and Traveling Clinics. The rules for the three are all different, and are different in order to be consistent with principles that are the same for all. These principles can perhaps be best discussed with the three associated agencies as examples.

All three demand that the patient shall be sent by a doctor, and will even go to the expense of a long distance 'phone call to connect up a ctor with a patient who has come for exam- ation "on his own." All three insist on mak- g the report to the doctor, directly if possible, it always in writing in any case. So all three e consultation stations for doctors to use.

The Travelling Clinic examinations are en- rely free, and money offered would be refused. e cannot afford to make distinctions between a y class and a non-pay class in a community here everybody knows everybody. We cannot ford to have people stay away rather than pay. hen a large family connection has been ex- sed we *can't* afford to have them raise the estion of what they *can* afford.

The Central Tuberculosis Clinic is different. is in the city only a few blocks from men special experience, and plenty of x-ray plants, wntown. Any who can pay for special experi- ce in private practice, should do so. We in- st, therefore, that the doctors should send to us ly those who cannot or should not pay, and e make no charge. Often the discovery exam- ation is made in private practice, but the shoal contacts, the Public Health part of the job, sent to us. We refuse to make examinations r pay because this would bring us into opposi- on with men of special experience and equip- ent. As long as we deal with the non-pay asses only there is no difficulty.

At Ninette, however, we are in the heart of e country, 150 miles from the big centre. part from ourselves, the nearest chest special- ts are at the State Sanatorium of North Da- ota. Here, we consider we should not exclude rom examination people who, if they were in e city, should pay. So we charge or do not arge according to circumstances. However, ny of you who know the depression, drouth nd grasshoppers of the prairies, the eagerness f our organization's missionary spirit, and the esponsibility we accept for the whole province, ill not need two guesses as to whether our diag- ostic work is done more with pay or without ay.

If we are not prepared to pretty much give iagnosis away we are going to be a very long me in getting tuberculosis stamped out. Diag- osis bought and paid for, as groceries over a ounter, won't get us very far among contacts nd suspects and nowhere at all in surveys.

Sanatorium and Travelling Clinic

I suppose travelling clinic work can be done without a Sanatorium as base, but if I were as Calvinistic as my upbringing by an Aberdeen ancestry, I would consider these two as foreordained for one another from the very beginning of the world. Almost every Sanatorium serves a special parish or field. Why should it not be the chief cultivator of that field? It is a fine fortress with all sorts of fighting power, and a great place for general headquarters. Why should it be merely a base hospital for the wounded? A Sanatorium doctor should know the firing line as well as the fortress; should know the homes his patients come from and go back to; should consider waiting lists as well as ward lists; and work out general strategy for combatants as well as care of sick and wounded. When a Sanatorium can take care of field work by stretching staff and facilities just a little it is uneconomic to pile up an entirely new overhead. Our Sanatorium men come back from clinics better Sanatorium men, and better campaigners against tuberculosis than when they went away.

The Travelling Clinic is of special value as a skirmishing unit in the hinterland settlements. There are slum areas in country as in city. Among these with us are the Indian reservations and other areas of Indian admixture. We infected the Indian and he is now unwittingly, but ignorantly, bringing the infections back again to us with accumulated interest. With new ways of transportation and the opening up of the North, the Indian even on reservation is no longer a segregated person. Indian settlements are leaking tanks of all infections. In Manitoba our reservation Indians, slightly above 2 per cent of the population, have 31 per cent of the tuberculosis deaths, and the total of Indian race, about 5 per cent of the whole population, have 45 per cent of the tuberculosis deaths. Indian people do not respond so very well to treatment, but Indian settlements respond well to preventive measures.

The Practitioner and the Campaign

It is a truism that the best of all health officers is a disease-prevention-minded general practitioners, especially in the country. And it is also a truism that the anti-tuberculosis campaign would be paralyzed and futile without the full coöperation of the general medical profession. It is a matter of utmost importance, therefore, to discuss just the part the local doctor should play.

There are a number of general considerations. In the first place, as I have already said, leadership in the campaign is necessarily the business of a medical group of special experience, mostly employed in public capacities, such as Sanatorium men, on full time. There are men of special experience and leadership in tuberculosis also, sometimes very eminent, who are altogether or in part in private practice. But even this combined expert group is necessarily not very numerous. Apart from these, doctors differ widely in their types of practice and their knowledge and facilities for this special kind of work. I went over the list of doctors in Winnipeg recently and found that each morning after breakfast 300 doctors went out to eighty different types of work, the obstetricians of course having been out before breakfast.

In something more than a quarter century of tuberculosis work I have tried to avoid calling tuberculosis a specialty, or myself a specialist. There is no medical practitioner, obstetrician, insurance doctor, medical journal editor, surgeon, pathologist, ophthalmologist, or medical man of any kind who must not know something worth while about tuberculosis if he knows his own job at all, and all must always be on the alert for it.

But that does not mean that any of these good men taken at random could or should try to make decisions along the boundary line of contacts and suspects, as to which are clear, which are definitely diseased, which have slight or old inactive lesions, which are infected, and what they should all do about it. We concede readily that special training and experience are needed for one who would treat tuberculous people in a Sanatorium. But very special training and experience is not more needed in Sanatorium treatment than it is in border-line diagnosis. Medical practitioners are getting much better in their diagnosis of frank tuberculosis, but they simply can't deal with the border-line cases, and they know they can't. Of a whole expert staff it should be the most expert who should be assigned to the border-line work, and given the best facilities.

The local doctor, without special experience and without facilities, cannot do that most difficult and exacting and important job. A short brushing up will not make him able to do it, though it will make him more interested, and a better coöperator with those who can do it.

Quite apart from his experience or inexperience there are other reasons why the local doctor cannot do the border-line job. He never has done it. From Hippocrates until now it has been his job to deal with present disease, not future possibilities in disease. His first question for twenty centuries and longer has been, "What ails you?" and if nothing ails you, why should you go to him? On the other hand, almost the only interest of the anti-tuberculosis campaign in the sick man is to segregate him, and its great work lies with the people who are not sick. This is something new in medicine that the medical armamentarium of teaching and training and the medical point of view and psychology are not prepared for. It is something new in medicine that the social adjustments of medicine, even the ethics of medicine, are not prepared for. The doctor must not solicit patients. He must stay in his office until the patient solicits him. He simply cannot gather in all the well people in the Jones connection for examination in his office at so much an examination, and get away with it. A clinic or sanatorium group are expected to do that very thing. It is their job. If they don't do it they are criticized in the community for not doing it as a practitioner would be for doing it.

An outsider in a public service, and with special training, can do what the local man could not possibly do both in getting people in, and in giving them a worth while decision along this difficult border line, once they are in. In my experience no man in the community appreciates this expert service, with x-ray and all the rest of it, so much as the practitioner himself. That Jones focus of infection and possible disease has been a sort of community chestnut burr that he could not open, a challenge he could not take up. And to have the problem worked out with him, and for him, and all who need his care sent to his office, and put under his care in the orthodox way he considers a very great service.

Looked at superficially it may seem that the anti-tuberculosis campaign, with its specially trained groups, has taken away from the work and the prestige of the local doctor. As a matter of sober fact it has added immensely to both. Before the campaign, the "consumptives" were brought to the doctor either already galloping toward the grave, or travelling the same road more slowly in chronic bilateral disease. Such cases were all grief to the doctor, and no credit. So much was this so that it was the fashion to send them all to other climates, *any* other climate, *anywhere,* so long as they were far enough away. When they returned it was the undertaker who was in charge.

After twenty-five or fifty years of campaign, conditions are very different. A number of men, it is true, have been removed from general practice to give leadership in this phase of work. Patients are not sent south to die but to nearby Sanatoria to get better. The life of a tuberculous man, as I've no doubt you know, is divided into two parts: first, the time before he has tuberculosis; and second, forever afterwards. Only a comparatively small part of that "forever afterwards," on an average, is spent in sanatoria. The rest is under the supervision of the local doctor. And in the case of known contacts, or known slight lesions, even the pre-tuberculosis period is brought to the doctor's office also. The Manitoba Travelling Clinics, after a few years on the job, had about 500 known tuberculous people in the doctors' hands five years ago—old Sanatorium patients, healed lesion cases, etc. In the succeeding five years that number was raised to more than 1,600. In this five years, and not the beginning five at that, the clinics increased the local doctor's tuberculosis practice three-fold, left him with three patients to look after for every one they had found him with—and even that one they had found for him, for the most part, in previous years of clinic work. So the anti-tuberculosis campaign is not taking work away from the doctor, but putting work into his hand, not taking away patients, but sending patients to his office. It is not sending him grief and incurables, but work he can do and do with credit, and it is giving him an expert partner in this work who does not need to be paid, indeed will not acept pay.

Of all tuberculous people who need to be watched, and examined and advised from time to time perhaps not 10 per cent are in sanatoria or hospitals at any given time. The others all should be in touch with local doctors. So if the only consideration were the local doctor's share in tuberculosis work it would be at its greatest when case finding was at its best. If quantity of practice were the only consideration the local doctor could very well afford to pass up border-line diagnosis, and have the tuberculous people found for him by more expert diagnosticians and sent to his office for him to take general care of. This is in the interest of the campaign also.

One question concerns what our legal friends would call the onus. Should the onus of case finding be, as it is at present, upon clinics, sanatoria, central agencies with experienced and expert staffs? Or is it to be given to the general practitioner? I believe strongly that the onus, the chief responsibility for diagnosis, prognosis, and important decisions along the contact border line should as far as possible remain with the more expert and better equipped staffs, under the control of the central organizations, but working with and for the practitioner. I do not think that the onus of case-finding and its more difficult decisions should be delegated to the general practitioner unaided, however many refresher courses in tuberculosis he may have had, or even if he should have an x-ray outfit. I believe, moreover, that with the onus on the practitioner not only would the cause we serve be the loser, but the practitioner also. At the same time it must be well understood that the patients belong to the local doctor and not to us. We are in consultation with him and the patients are his patients.

There is another consideration. In the past half century two great movements are revolutionizing our art. One is the marvellous advance of medical science. The other is the changed attitude of the people toward the distribution of medical science for the needs of the people. About what medical science shall be, we have the last word. But about how we shall distribute medical science in public services or by private arrangement, in that matter Democracy has the last word. Democracy has landed on all fours right in the middle of the distribution of medical science, and is there to stay. If the people decide, as they certainly would in Manitoba, that they are going to have the advantages of specially skilled agencies on this difficult diagnostic border line, then they are going to have them sooner or later, whatever we may resolve or plan. Our profession may propose, but Demos will dispose in this matter as in many others. We have said for centuries, "salus populi suprema lex," the welfare of the people is the highest law. So it is. And now democracy has started in to see that this highest law is enforced. What is best for practice is not now the big question and never again will be. The big question is, and will be, what is best for the people?

The Public Health Nurse

One important matter: We must be careful that the most useful and indeed indispensable worker, the Public Health nurse, does not become a liability instead of an asset by unnecessarily arousing the antagonism of doctors. It is true that there are many situations in which antagonism can develop very easily. I have already said that a public service or voluntary service diagnostician along the contact border line is merely a consultant. The patients are the patients of the local doctor. Realizing this will keep our attitude correct, as between doctor and doctor. We will consult the doctor about seeing *his* patients, and will report our findings about *his* patients to him. If a Public Health nurse will only think of the patients in the same way, and courteously consult with the doctor about *his* patients, realizing that they are not, and never will become, *her* patients, however poor and dependent they may be, half the difficulties of Public Health nurses in relation with doctors will vanish. After all, nurse etiquette in these matters is just physician-consultant etiquette.

Results

How shall we measure results? In a quarter century our big concern has passed from the diseased person to the infected group. We are applying prevention, cure and prognosis not only person by person but province by province, and state by state. Deaths are getting fewer, cures and half-cures are increasing, but the big intangible fact we can scarcely measure by any statistics is about the gross total of community infection. Is it getting noticeably less? It think it is.

We look on the whole mass of citizenship as a unit. That is a mistake. In Manitoba, for instance, anti-tuberculosis effort began twenty-five years ago. In comparable populations the tuberculosis death rates has been cut down to *one-fifth* in that quarter century. Not so bad! But really it is better than it seems. Who are the people whose decreasing deaths we are counting? Some were middle-aged before our work began. Young adults then are only in mid-life now. More than half our present people were pretty well tarred with the old stick. Less than half of them have been much affected by our cleaning up of infections. Each year that comes gives the babies, the budding flowers that make their own springtime wherever their glad faces appear, a cleaner and ever cleaner world to be born in, grow up in and in turn have babies in. We are doing not badly considering the old pre-sanatorium, pre-clinic, pre-campaign population we still have. The best results of what we *have already done* won't be apparent for another quarter century. I firmly believe—perhaps it may be put down as a tentative law—that *wherever tuberculosis deaths in a whole population of mixed ages has been cut down to one-fifth, the tuberculosis menace to children now being born has been cut down to one-tenth or less.*

Thus year by year, in the very flow of the generations down the river, below the kirk, below the mill, below the lighthouse top, into the great broad sea—all that is old passes gradually and quietly away, and all things become new. To heal a sick man of the generation before last is something; but to make the world a cleaner birthplace for the children of today and tomorrow is *everything.*

SIDE-VIEW SKETCHES OF PHYSICIANS*

ARCHA E. WILCOX, M.D., F.A.C.S.
Minneapolis

BY precedent the time has arrived for the president's address, a custom for which I m not entirely responsible.

In assuming this obligation, it has required onsiderable courage on my part to reach a deciion as to which road to travel, and in what place o stop. However, as there seemed no way to urn back, I have endeavored to reach my destination, through highways and byways, many imes laboriously retracing my steps, but diligently carrying on.

This irregular course, much to my liking, has aken me through strange lands, as well as familiar places. By journeying along the out of the way biographical lanes and not adhering to the usual historical highways of travel, I have discovered many views of the physician which differ from the familiar side he usually exhibits in his routine scientific pursuits.

"Human conduct affords the best raw material for the novelist."[2] Therefore, is it little wonder that the physician has taken such an active part in literature? Certainly from his daily experience and application of his art he comes in contact with material, the rawest of the raw. Who more than the physician is closer to, more familiar with, or has greater opportunity to collect genuine themes of life's activities? He learns about life, observing the beginning at birth, the suffering en route, and the termination at death.

I have to a considerable degree become more or less convinced that authors and biographers aspire to present a literary composition of acceptable style, creditable to themselves, and pleasing to their readers, rather than frankly and courageously to paint a life-like word picture of the gone but not forgotten man. Recording the accomplishments of celebrities and the memorable deeds of distinguished men is of the greatest value to posterity; but what of the man, himself, his intimate social activities, environment, activating influences, ambitions, avocations, and emotions? He must have been human, he had feelings; undoubtedly he experienced romance and adventure.

The lapse of time softens much the hatred between individuals as well as nations. Neighborly feuds eventually become unraveled. But, on the contrary, historical anecdotes, frequently through repeated recitals, become much embellished by enthusiasm, inflated by imagination, or disfigured by handling; thus making it doubtful, if not impossible, for the offspring to recognize his own mother.

Rabelais

That monk, Rabelais, physician, roving secular priest, master of sciences, linguist, philosopher, creator of Gargantua and Pantagruel, was above all a humorist. His religious activities, philosophy, and science all find their outlet in his humorous writings. His humor made him a good mixer, his roving adventures brought him in contact with all walks of life, and there is little doubt that he joined in the revelry of life to a degree that his experience therefrom became of the same dimensions as that of his intellectual development, and from these experiences and observations, his humor and satire found full expression in his criticism of the church, state, and judiciary of his time.

In creating Gargantua and Pantagruel he produced a medium through which he obtained great amusement in exploiting his philosophy and humor. Pantagruel became his loud speaker, propagandist, alibi, and master. In modern terms, Pantagruel was his broadcaster and publicity agent. The mythical character, Paul Bunyan, of colossal size and marvelous deeds is undoubtedly a modern revival of this historical monster. It is quite apparent that one of Rabelais' objects, in creating this fanciful monster, Pantagruel, was to attract personal attention and financial profit, through him. In this he did not fail for we have it on record from him that his book was one of the "best sellers." "More copies were sold in two months, than of the bible in nine years." He had a keen nose for business and a deft appreciation of the susceptibility of the people, capitalizing his "jovial and laughter-loving doctor's temperament."

---

*President's address before the Minnesota Academy of Medicine, January 9, 1935.

In the last chapter of Book II he says, "If you say to me, Master, it would seem that you were not very wise in writing to us these flim flam stories, and pleasant fooleries; I answer you, that you are not much wiser to spend your time in reading them. Nevertheless, if you read them to make yourselves merry, as in manner of pastime I wrote them, you and I both are far more worthy of pardon, than a great rabble of squint-minded fellows, dissembling and counterfeit saints, demure lookers, hypocrites, pretended zealots, tough friars, buskin monks, and other sects of men, who disguise themselves like maskers to deceive the world."

I have not felt the time wasted in reading Rabelais' writings nor have I deplored the effort expended in following his biographers and critics to prove him saint or sinner, clown or counsellor, charlatan or humanist. He was a man of many parts and sides, geometrically an octagon, and in many respects a victim of intelligent development far beyond his time, full of the appreciation of life. To me, he put far more into life than he took out. Irrespective of his many critics, he left a heritage of good humor, wit, wisdom, and common sense, which could at the present time, if properly interpreted, be well appropriated for enjoyment, profit, and spiritual help.

Thomas Dover

There is a period of fifty years, spanning the close of the 17th and the beginning of the 18th Centuries, during which piracy was in bloom. Hurd refers to it as the "reign of the pirates" and during these years rollicking romances of the sea, blood curdling tales of freebooters, and the deeds of predatory and plundering Buccaneers afford sufficient daring, illegal, and immoral action, to satisfy the wildest imagination of the old as well as the young.

One of these Buccaneers was a physician, Thomas Dover, by name, who was born in 1670 and died in 1742. For my intimate acquaintance with this gentleman of the old school, I am indebted to Sir William Osler, whose fascinating essay was published in the Johns Hopki Bulletin, 1895.

When I was a student of Materia Medica an learning to mix ipecac and opium, I did no know that the concoction which was calle "Dover's Powder" originated in the adventurou mind of a Buccaneer, nor did I dream it woul be rediscovered or reborn in the 20th Centur as a specific for the common cold.

Thomas Dover, therefore, comes down throug history to us in "powdered form"; yet, with th virility of the swashbuckling Buccaneer whos daring adventures as "third in command, an one of the principal owners and president of th Council of the Duke and Duchess Privateers o the ancient and honorable city of Bristol" provides a special and dramatic chapter in the history of this period.

Thomas Dover practiced medicine in Bristol and, strange as it may seem, made money, an joined with some merchants in a privateering expedition in 1708.

There was in Bristol at this time, a Willia Deering who had sailed the Spanish Main. H agreed to accompany Captain Woodes Roger as pilot of the expedition promoted by Dove and his associates. It was during this expedition that, off the western coast of Chile, on th island of Juan Fernandez, the lonely Scot, Alexander Selkirk, was discovered. This even proved to be the spark exploding the imaginatio of the indefatigable writer, Daniel Defoe, resulting in the immortal story of the "Life an Strange Surprising Adventures of Robinso Crusoe."

From this view of the side career of Thoma Dover, I am reminded "there is honor amon thieves" for history states that of the propertie peculiar to Buccaneers, one was their manner o dividing the booty gained by plundering sea coast cities, and ships on the high seas. "Everyone who had a share in the expedition swor that he had reserved nothing of the plunder. A false oath was of extremely rare occurrence and was punishable by banishment to an uninhabited island." "The wounded first received their share which was greater according to the severity of their wounds. The remainder was divided in equal parts and distributed by lot." (This may have been the origin of the fee-splitting system.)

Religion was strangely blended with their vices nd they began their enterprises with a prayer." he spoils, however, were dissipated in most de-raved manner.

Samuel A. Mudd

On April 14, 1865, President Lincoln was ssassinated by John Wilkes Booth, at Ford's heater in Washington. That frightful event hrew the entire nation into deep mourning, and arked the beginning of a strange and horrible ragedy in southern Maryland.

Following the shooting, Booth jumped from he President's box to the stage of the theater, nd fractured his leg. The excitement and as-onishment of the players, as well as that of the udience, evidently assisted in his escape. Booth as able to leave the theater through a rear tage door, and, abetted by a confederate, David . Herold, mounted a horse and rode away in he night. They traveled South into Maryland. or thirty miles Booth endured the pain in his nkle but at four o'clock in the morning he topped at the home of Dr. Samuel A. Mudd nd requested treatment. Dr. Mudd, a respected, opular, and well to do country practitioner, reated the patient and, after a few hours' rest, he two conspirators rode away.

Later in the day, as the news of the Presi-lent's death spread throughout the country dis-ricts and reached the ears of Dr. Mudd, he mmediately became suspicious and, driving to he county seat, he reported his experience with he then unknown patient to the authorities. nstead of receiving their gratitude, he was orthwith taken into custody. The country was n a blazing rage, passion was unbounded, and vengeance permeated the air. The fact that Dr. Mudd had seen and treated Booth was sufficient o spread the impression that he was at fault; and, if not guilty in assisting in the crime, had aided in the escape.

He was tried by a military commission, con-victed largely on negro evidence, declared guilty, and sentenced to life imprisonment. In due time he was committed to Old Fort Jefferson to serve his sentence.

An interesting and vivid description of Old Fort Jefferson is given by George Allan England in his "Isles of Romance—Tales of Tortugas." Fort Jefferson is located in the Gulf of Mexico, one hundred and twenty miles out at sea, off the coast of Florida, on one of the Isles of Tortugas. "No more desolate place of imprisonment could have been found within the limits of the United States." In this desolation the unfortunate doctor began to serve his sentence and to pay the penalty for debts he never contracted, and for crimes of which he was entirely innocent.

England, in his "Tales of Tortugas," quotes freely from the letters of Dr. Mudd, written while in prison to his devoted wife. These letters, preserved by his daughter, record an experience of misery, mental, and physical suffering almost beyond human belief. They elicit from the reader the utmost resentment and a pity of unmeasurable depth.

Upon his arrival at Tortugas in July, 1865, he was assigned to duty as a hospital orderly at the Fort. From these menial duties, with several companions, he made an attempt to escape, was captured, and rewarded by adornment of heavy chains and placed in a filthy dungeon, his description of which rivals that infamous Hell Hole of Calcutta. There he suffered from hunger and thirst, the irritation of vermin, bites of insects, filth, and dampness. To add to his physical distress, picture the humiliation of a southern gentleman in these surroundings, with negro guards. For sixteen months under these conditions he merely existed and then was transferred and assigned to work in the carpenter shop.

Yellow fever became active in the South and Old Fort Jefferson was invaded by an enemy with which it could not cope. The suffering among the officers and soldiers became pitiful. The fort physician died and Dr. Mudd, in spite of his degradation and ravaged physical condition, volunteered to serve as garrison physician. He was then allowed the freedom of the Fort, took complete command of the situation and plunged into the work without thought of self. Truly a magnificent example of fortitude, sacrifice, and heroism, he worked night and day. He suffered an attack of the fever, recovered, and took up his tasks again. The ravages of the fever were dreadful. At one time only ten of the officers reported for work. Guard duty was suspended and, had he chosen, escape would probably have been comparatively easy, but the Doctor felt his services were needed and, therefore, he remained on duty. After the epidemic abated his sacrifices and services commanded the respect and deep gratitude of the surviving soldiers and, unknown to him, they sent a petition praying for his pardon to President Johnson, but ill luck for the time pursued him. The original petition, through the hazards of administrative red tape, failed to reach the President's attention and Dr. Mudd was ungraciously demoted to his former status, to assume his former duties, and abide in his cell.

What punishment! Over his cell door he scratched the following words, "All Hope Abandon, Ye Who Enter Here."

In 1869, President Johnson pardoned him. Dr. Mudd, weak, broken in health and spirit, returned to find his farm devastated and his home gone. He never regained his health, but made an attempt through sheer courage and determination to reestablish his practice. Devoting his remaining thirteen years to the suffering, he died from pneumonia contracted from exposure in a severe storm while responding to a night call of one of his patients.

Oliver Goldsmith

A tabulated résumé of Oliver Goldsmith's career affords a conglomerate collection of vocations and avocations during thirty-one of his forty-six years of life which is anything but creditable. Johnson said of Goldsmith after his death: "He was a plant that flowered late; there was nothing remarkable about him when he was young." "Although the traits and dispositions of the boy often afford indications of his future character, it is impossible to predict what the future man will be."[7]

A sensitive youth, born in Ireland, November 10, 1728, early he showed fondness for music, learned to sing and dance, and play the flute. The story is related by one of his biographers, about one of his friends, who, wishing to test Goldsmith's knowledge of music, presented him with a piece of music to prove his ability to read the notes. Goldsmith placed the printed sheet, upside down, and made sweet melody upon his flute, but it is not stated whether the music which he played came from the notes he had in front of him or from his mind alone. Certainly he was not made of barren clay, for his mind was of fertile soil upon which the seeds of the fundaments of the French and Italian languages took root, and he became proficient in both, subsequently to put them to good use.

At the age of nine he exhibited the talent of repartee, a delightful example of which was manifested in his pat retort to an older boy who was playing the music to which Goldsmith was dancing the hornpipe at a children's party. The older boy made some remarks about Oliver's disfigured, pox marked face, nicknaming him Æsop. Oliver finished his dance, then, directing full attention to the older boy musician, and in dramatic fashion said,

> "Our herald hath proclaimed the saying
> See Æsop dancing, and his monkey playing."

Goldsmith's family was very poor, and remained so. Had it not been for an uncle who possessed some means, and who never lost faith in him, it is doubtful if he ever would have had the schooling, such as it was, that he obtained.

While making the trip to attend his last year of school at Athlone, he had in his pocket a guinea, given him by a friend. Of Oliver's many weaknesses, was the love of grandeur, dress, and position. The guinea in his pocket gave him a feeling of affluence, and he inquired, when reaching the town of Ardagh "where he could find the best house in town," meaning, of course, a hostelry or inn where he could put up for the night. The local wag, of whom he happened to inquire, directed him to the private residence of a rather distinguished citizen. Arriving in the yard, he called for someone to care for his horse, entered the house, and, with all the form and assurance imaginable, ordered dinner, and invited the host, whom he found comfortably seated before an open fire, to join him. The host, a man of keen perception, immediately grasped the situation, and, drawing Oliver into conversation, found he had a slight acquaintance with the boy's father, and for amusement kept up the deception. It was not until the following morning, when Goldsmith expressed his satisfaction with the services rendered to him and demanded his bill, that the genial host informed him of his mistake, and he learned that he had been so hospitably entertained in a private home.

This experience proved to be of exceptional value. Later in life he used it as a foundation for that exquisite comedy "She Stoops to Conquer," the popularity of which never seems to wane.

At the age of seventeen, we find he entered Trinity College in Dublin. He entered as a poor student, classed as a Sizar, one who, for his tuition and board, does menial duties, such as waiting on table and sweeping the halls.

At this period Dublin was a gay city. Hospitality and show of splendor developed keen rivalry among the distinguished residents. The masses aped the upper classes, dressing in their second hand clothing and mimicking their behavior and entertainment, as long as the purse would last, at the public inns. Religion was at its lowest ebb. Disregard for the Church and its teaching existed in both extremes of society. No entertainment endured without the bottle. No form of gaiety evolved without preliminary priming to be followed with constant drinking. "Drunkenness and foul talk were thought no discredit." Celebrities appeared in public with their mistresses. "There seemed to be no respect for the marriage vow. For example, Lord Chesterfield, in his letter to his son, instructs him in the art of seduction, as part of a polite education."[5]

Police authority was meager, as evidenced by the mob violence, especially in London and Birmingham. The introduction of gin caused further and renewed interest in drunkenness. "In the streets of London at one time, gin shops invited every passerby to get drunk for a penny, or dead drunk for two pence."[5] "There was no such thing known as a banquet without bloodshed." "Party feeling ran high, and that was an element which the fellowship of one bottle allayed, but the indiscretion of a second inflamed; with the third or fourth per capita came the brawl."[6]

Into this environment came young Oliver Goldsmith, a sensitive, imaginative, and lazy, if not dull, country boy. His college days seem to have been about the most miserable of his life. To what extent the environment affected his sensitive nature or warped his developing character is speculative. He, however, survived this critical period, but not entirely unscathed.

He was not industrious, builded no fences to protect his morals, and gambling became his addiction. He was aimless, irresponsible and generous to a fault, never being able to resist parting with his last shilling if a beggar sought aid. He was frequently flunked, upbraided, and abused; even physically assaulted by his instructors. Although ridiculed by his classmates, disgraced, and degraded, he eventually received his B.A. degree.

The following three years were spent in idleness. However, being arrived at a permissible age, he knocked at the Church and presented himself as a candidate for Holy Orders, but was immediately disqualified and slumped into dreamy inactivity. Ambitionless, he apparently was satisfied to only live. A visit to his Uncle Contairne at Kilmore, for want of anything else to do and having no other place to go, brought him in contact with another guest, the Dean of Cloyne, who for some unknown reason suggested that Goldsmith take up the study of medicine. Immediately his uncle offered to finance him and Oliver offered no objection. "He himself had no idea what profession he was fitted for; but he knew that he was fully qualified by an open mind to spend some interesting years in a strange place at the expense of some one else."

Two years in Edinburgh, and he wrote his uncle: "I have seen all that this country can exhibit in the medical way, and therefore I intend to go to Paris. As I am perfectly acquainted with the French language I shall have much the advantage of most of my countrymen in pursuing my studies." His adroitness in extracting money from his uncle was amazing, his inability to keep it for profitable use was appalling.

His letters from Paris contain free criticism of his lecturers with some reference to medical activities, yet, lengthy discourses with detailed description of the people, customs, and country. He was a penetrating observer and was acquiring a zest for description.

From Paris he went to Leyden, ostensibly to continue his medical course. He reached Leyden "only after as many vicissitudes as would form the groundwork for quite an exciting story encompassing arrests, shipwrecks, and delays."[6] Letters from Leyden exhibit increasing aptitude and a capacity for descriptive ability of general subjects, and less of the special subject of medicine. He was obviously, but unconsciously, becoming interested in the profession he would ultimately select as a means of earning a living.

The gains of one night's gambling, and the next night's losses caused him to borrow in the morning. With this money he started on a trip through Europe, but before he had left town he was again penniless through silly sentimental purchases.

For a year he tramped through the Continent without money, friends, or baggage; however, he had taken his flute with him, by the frequent playing of which he was able to collect alms along the way, and thus obtained, irregularly, nights' lodging and enough food to avoid starvation. He returned to England, destitute, dilapidated, and in rags.

Landing in Dover, starvation literally stared him in the face. It was three weeks before he reached London. How he got there or what trials he endured are not recorded. His assets now consisted of a college degree, a certificate entitling him to practice medicine, his flute, and a panoramic memory of his travels, experiences, and people.

Although destitute and hungry, he was fortunate, in a short time, to obtain work at an apothecary's shop. Thus being relieved of anxiety he enjoyed a rest for a few months. While thus employed he ventured to call upon a Dr. Sleigh whom he had known while a student in Edinburgh. Dr. Sleigh showed him much kindness and with his assistance he attempted to enter the general practice of medicine at Bankside, Southwark.

Goldsmith as a practitioner was a failure and whatever the reasons were, enumerated by his biographers, the real analysis is that he was a misfit. It was, however, this very attempt at the practice of medicine which brought him one patient who was employed in a printing office of a Mr. Samuel Richardson of Salisbury Court. This gentleman, seeing that Dr. Goldsmith had some leisure time, made an offer to employ some of his spare hours as reader and corrector to the press of Mr. Richardson. This turn of events marked the beginning of his literary career, for which results the world is grateful.

Without his roving we would have had no "Vicar of Wakefield." Without his vices we might not have had those cherished bits of humor and satire, coupled with the thorough understanding of the deeper human emotions. Without his early ale house associations, when o evenings he occupied the chair at the local pub we might have missed the ridiculous situation in "She Stoops to Conquer," and have been denied the philosophy served in that delicious dis "The Song of the Jolly Pidgeons."

This song is sung in the play by the characte Tony Lumpkins, but I can see no one but Goldsmith himself warbling,

"Let school masters puzzle their brain
With grammar, and nonsense, and learning
Good liquor, I stoutly maintain
Gives Genius a better discerning."

Again:

"When Methodist preachers come down
A preaching that drinking is sinful
I'll wager the rascal a crown
They always preach best with a skinful."

Chrisholm states Goldsmith was a parasite o the medical profession. We'll let that stand, bu as a writer he has "ever been the best loved o England."

Oliver Wendell Holmes

Oliver Wendell Holmes, a physician, becam one of the ever best loved of American writers It is unnecessary to compare these two physicians as far as their medical achievements ar concerned, for it was only through literature tha their lives, like the surfaces of two spheres, contacted at a single point. Osler says, "The grea distinction of both men lies in that robust humanity which has a smile for the foibles and a tea for the sorrows of their fellow creatures."

Holmes was proud of his ancestry and ha reason to be. He was moderately studious When in prep school he showed literary genius

After one year at Andover he was prepare for Harvard. At this time there was anchore in the Charlestown Navy Yard, the old frigat "Constitution," and the Government was abou to dismantle and wreck her. Holmes' sentimen was so aroused at the thought of such insult t the old historical craft, that in a patriotic, eloquent, outburst, he wrote a stirring poem pleading for her preservation. This poem was published in the Boston Advertiser and from thes columns extensively copied. The poem was als istributed on the streets in the form of hand ills, and so aroused the patriotism of the people iat the old sea fighter was preserved. Holmes on immediate fame.[1]

The poem affords a splendid example of his irile literary punch, comparable with the flaming ratory of Patrick Henry.

I quote the last four lines:

> "Nail to the mast her holy flag,
> Set every threadbare sail,
> And give her to the god of storms,
> The lightning and the gale."

Through college he traveled with creditable ank. He frequently wrote verses for the colge periodicals. He was chosen class poet, wrote ie commencement poem, and was elected to Phi eta Kappa.

Following his graduation he studied law, all ie while contributing anonymous contributions o the "Collegian." Holmes stated that during iis year at Law School he was repeatedly temptd to "Pen a stanza, where he should engross." He did not speak unkindly of his study of law, ut thought he liked medicine more, and thereore began his medical studies under the intructions of Dr. James Jackson and his assoiates. These labors he continued for two and ne-half years, then went to Europe for a three ears course in Paris and Edinburgh.

He, like Goldsmith, wrote home giving elabrate descriptions of the people, cathedrals, hisoric structures, and anecdotes connected thereith. The reference in some of these letters to iedical subjects appears of postcript imporance only.

Holmes was brought up in a religious atmoshere and apparently sufficiently supplied with nancial aid, so that he seems never to have uffered hardships. Up to the time he returned o America his travels and studies had taken im over much of the road covered by Goldmith, but the views they obtained were from ifferent sides of the street, and their haunts nd places of amusement, during recreational ours, were undoubtedly more widely separated. Both were keen observers, both had the unconrollable urge to write, both became engrossed n general subjects outside of their special medcal studies. That part of their mental equipment which in the beginning only functioned as or appeared to be "side lights," by some developmental method of nature, became transformed into glaring "head lights" directing the way to enviable achievement and everlasting fame.

S. Weir Mitchell

I shall always be grateful to my father, fate, and fortune for having had the opportunity, while a medical student in Philadelphia, to personally have met and known some gentlemen of the medical profession, whose characteristics and accomplishments are indelibly imprinted in my log book of Memory Lane.

Among them, a memory which I hold most dear, was the privilege of a short, but intimate acquaintance with that distinguished Philadelphia gentleman, physician, and author, S. Weir Mitchell.

With my inadequate pen I have not, from memory alone, attempted to draw a word picture of this celebrated physician, but have taken the liberty to resort freely to his "Life and Letters," so magnificently done into his biography by Anna Robeson Burr. Upon the fore leaf of this work is printed the following lines, "Every human being who is worth it, lives a second life after the first is ended, in the hearts of his friends."[3]

John Kearsly Mitchell, friend and contemporary of Edgar Allen Poe, was a Philadelphia physician whose tremendous interest in life, civic affairs, and literary fields carried his influence far beyond his professional sphere. But more of him at another time. From this stock came the son, S. Weir Mitchell, who early in childhood developed the true book love and "fed his intelligence with books as one would stoke a furnace" and, like his father, soon developed a keen interest in history, politics, and literary discussion.

Ninety years ago, at the age of fifteen, he was admitted to the University of Pennsylvania, which he calls "at this time a small affair with some good men."

He was a student and got on fairly well, evidently amusing himself in an average way, for he writes, "my set were already too much given to billiards and complete idleness, and some took too much stimulus, but I never except once had the least desire to do so. Then I took too much and the consequence answered as an enduring lesson. Twice I have felt the abrupt effect when, long thirsty, I swallowed a single glass of white wine. On both occasions it affected only my legs and mostly the left; this is true of all poisons, they never act alike on all organs or on all organs alike."

I regret that time does not permit a digression further into his early home life, which was happy and delightful. One glimpse, however, seems permissible. He writes, "I think while I was at college I must have heard all of Akenside, Pope, and much of Dryden read aloud of evenings, when the Scotch whiskey punch was brewed, and songs followed, my father leading in his delightful tenor."

Mitchell early wrote verses. At age seventeen, "To a Polar Star" was published in *The Nassau Monthly*. He had not, however, as yet learned to work; much of his time was given up to day dreaming. His father's illness necessitated decision, and after considerable discussion he decided to be a doctor, much to his father's disgust, who said to him: "You have no appreciation of the life. You are wanting in nearly all the qualities that go to make success in medicine. You have brains enough, but no industry." Young Mitchell persisted, "Well," said his father, "you have chosen, but let us have no changing. You have always been an undecided person." Dr. Mitchell admits his father's comments were true and correct enough, but defends himself in observing that "as I have said, I developed late, morally and mentally."

Mitchell tried surgery, at his father's suggestion, but surgery was horrible to him. He writes, "I fainted so often at operations that I began to despair. Moreover my hands were awkward." These experiences occurred during his apprenticeship in a Dr. Mutter's office. He was nearly four years in the study of his profession and was graduated in 1850. He had now learned to work and, as he expresses it, "I had now power to use my mental machinery." To put the polish on his medical education he went to Europe.

He writes, "Paget was then attracting attention and had just written his Pathology, a thoughtful advance. I dined with him and Quain and Carpenter, at the home of Dr. Jenner." His letters continue to be filled with exceptionally interesting experiences written in his inimitable style.

Remembering his father's wish that he interest himself in surgery, he applied himself to this particular branch of medicine, but soon discovered his unfitness, and, although in his early practice in Philadelphia he had several operations of importance, he came to the conclusion he had neither the nerve nor the hand; deliberately he gave it up and went into general medicine.

He had desired an interneship in the Pennsylvania hospital, but did not receive the appointment owing to prejudice due to differences which had occurred between the elder Mitchell and the Board.

Assisting his father, he progressed with the usual disappointments, reverses, and difficulties that most young physicians encounter. He exhibited interest in collateral sciences and one of his earliest papers was one on, "South American Snake Poisons, Corroval and Vao"; later, "Researches upon the Venoms of the Rattlesnake."

Meanwhile, he writes, "I was cautioned about my scientific researches interfering with my private practice, as it was rather expected that I should amble around in a covered buggy with a negro to hold my horse, to have a good bedside manner and a list of acceptable stories. A little discreet gossip was popular—more popular than sending for a surgeon too promptly."

A division of his autobiography deals with the following subject:

> "The history of a man's life is in what it produces. I have had four forms of product.
>
> First—Toxicology.
>
> Second—I have in my profession made what I may call practical discoveries and inventions.
>
> Third—I have written verse—almost all of it since I was fifty. This has yet to be judged seriously by time.
>
> Fourth—I have at last what always I was sure would come, success as a story teller."

There, in a few lines he has described his accomplishments, as he grouped them, but only detailed studies of each product would lead to an appreciation of his real worth.

In addition to having had the opportunity of seeing him in the hospitals, reading some of his scientific articles as well as fiction, and hearing im respond to toasts at banquets, I shall always emember one evening when, associated with Dr. ohn B. Deaver in Philadelphia, I had the exeptional opportunity of being a lone guest at S. Veir Mitchell's home. The occasion was not nusual or exciting for the Mitchell family, but or me, at that age, it was an event more imortant than the signing of the Declaration of ndependence, the Lone Eagle's flight of the cean, or the launching of the New Deal. The athering consisted of Dr. and Mrs. Mitchell, his listinguished son, John K. Mitchell, whose harming wife was formerly Miss Williams of Philadelphia, and the young doctor. A delightul, entertaining conversation on various subects of the day, material and immaterial, took lace during dinner, after which in the quietude f his incredible library, I was completely enhralled as I listened for more than an hour to his genius relating, as he only could relate, his xperiences, impressions, and almost beatific rections gained from a recent trip through the Holy Land.

S. Weir Mitchell's correspondence and intinate acquaintance with Oliver Wendell Holmes (who was a great friend of his father's) is scintillating with wit, good humor, friendly criticism, repartee, and science. In lighter vein Holmes, at the end of one letter, signs himself (showing that both men relaxed in foolishness at times), "Make believe I am, Most faithfoolishly yours."

I know of no greater evening's entertainment than the reading of these letters. Correspondence between Oliver Wendell Holmes, Sir William Osler, Dr. J. S. Billings, James Russell Lowell, George Meredith, Phillips Brooks, Woodrow Wilson, James Whitcomb Riley, Dr. Hideyo Nuguchi, and other great men, all of whom were the most intimate friends of this lovable character.

A list of his scientific writings, prose, and poetry would require for consideration an entire volume. Next to Benjamin Franklin he was the most versatile individual in the history of Philadelphia.

He, regardless of his many interests, was always a physician. Holmes, in one of his letters to Mitchell, said, "The world does not take seriously the side careers of men." He, himself, proved to be the paradox and Mitchell was loved for his activities in both medicine and literature if we so limit his careers. He regarded his medical occupation the most important of all and his success therein his chief ambition. If one met him and asked him, as many did, "What are you writing now?" he was more than likely to answer with a twinkle, "Prescriptions." His presence was felt in Philadelphia for three-fourths of a century. Life offered him a zest given to few. Happiness, romance, diverse interests, success in many spheres, sincere personal love of men and women of rare quality, and admired by a host of people he had never met. A rare companionship and professional association existed between Dr. Mitchell and his faithful doctor son, John K. Mitchell, who was ever at his elbow. The strength of their affections increased as age drew on.

> "What that tie had become when strengthened by a life of devoted service which hesitated at no personal sacrifice, even to the refusal of one of the most brilliant positions America has to offer a member of the medical profession (its acceptance would have necessitated his leaving Philadelphia and so also leaving his father), cannot be better expressed than by the closing sentence of a letter Dr. Mitchell wrote, just a month before he died. After expressing his complete and abiding confidence in the ability, judgment, and wisdom of his son, both as a man and as a physician, he ends with these words, 'I leave you my love. I have never loved any man as I have loved you. I shall love you still. Wier Mitchell.'"

References

1. Brown, Emma Elizabeth: The life of Oliver Wendell Holmes. New York: Werner and Co., 1895.
2. Collins, Joseph: The doctor looks at literature. New York: George H. Doran Co., 1923.
3. Emerson, Ralph Waldo: Representative men. Boston: Houghton, Mifflin and Co., 1883.
4. Encyclopedia Britannica.
5. Green, John Richard: History of England. New York: P. F. Collier, 1893.
6. Moore, Frank F.: The life of Oliver Goldsmith. London: Constable and Co.
7. Smiles, Samuel: Life and labor. New York: Harper Bros., 1888.

OLEOTHORAX*

A Report of Its Use in Twenty Cases

EVERETT K. GEER, M.D.
Saint Paul

DURING the treatment of pulmonary tuberculosis by artificial pneumothorax one or more of several complications may arise which are prone to imperil or ruin what otherwise would have been a successful and satisfactory result. Serous effusions, so common in pneumothorax cases, may become purulent and one is faced with that unpleasant complication—tuberculous empyema. Effusions, serous or purulent, almost always lead to pleural thickening and this in time frequently to pleural contracture, an obliterating pleuritis, which results in the pneumothorax space being lost, in the expansion of the lung, and in the return of symptoms, especially if the pneumothorax had been of short duration. A cavity may be so thick walled that air pressure is incapable of closing it or adhesions may prevent a good collapse. A pleuro-pulmonary fistula may develop which, if large, means failure of the collapse; if small, it may heal. A mobile mediastinum may defeat a pneumothorax by its shifting easily, thereby preventing sufficient pressure on the lung. The majority of patients who exhibit one or more of these obstacles to successful pneumothorax therapy are on the road leading to death, chronic invalidism or extrapleural thoracoplasty with the intermediate stations of phrenicectomy or pneumolysis or both. For some of these unfortunate individuals the injection of a neutral oil into the pleural cavity may achieve what pneumothorax could not, that is, a restoration of their health and their ability to provide for themselves and their dependents. In others it may lead to general improvement sufficient to warrant surgical intervention.

In brief then the principal indications agreed to by most experienced men for the production of an oleothorax are:

1. Tuberculous empyema, with or without secondary infection (Disinfection).
2. Progressively contracting pleura (Inhibition).
3. The desirability of a medium more constantly compressing than air (Compression).

Secondary, less frequently employed and more debatable indications for oleothorax are:

1. Small pleuro-pulmonary perforations.
2. Lax or mobile mediastinum.
3. Inability to obtain proper refills or economic necessity of lengthening treatment intervals.

Oleothorax should not be employed when a large bronchopleural fistula exists nor should it be used for serous pleural effusions.

Although small quantities of bland oils had been used in the serous membrane-lined cavities by several men prior to 1922, credit is generally given Bernou for injecting large quantities of oil into the pleural cavity. His first report[4] in 1922 dealt with an instance of pleuro-pulmonary perforation and in this paper the term "oleothorax" is used for the first time. Since then an abundant European literature concerning oleothorax has appeared. At first the reports were most enthuiastic but with time this fervor has been noticeably tempered with some men utterly condemning the measure. Bernou,[4,5] Kuss,[17,18] Fontaine,[11] Sergent,[28] Marie,[21] Morin and Bouessee,[24] Clerc[9] and many others have contributed on the subject. In the United States and Canada oleothorax has been acepted very slowly, as were artificial pneumothorax and the various surgical procedures now commonly used for pulmonary tuberculosis. In fact in 1931 the American Sanatorium Association Committee on the Treatment of Tuberculous Empyema found too few men using oleothorax in this country to form an opinion as to its worth. The first allusion to the intrapleural use of oil in the literature of this continent as it might relate to collapse therapy for pulmonary tuberculosis is a short article on some experimental observations by Archibald[1] in 1922. In using paraffin oil on several animals he noted that the pleura was irritated and that the oil tended to be absorbed. He was looking for a substance that would be non-irritating and non-absorbable, and therefore concluded that further effort with paraffin oil was not worthwhile. In 1927 Hayes[13] reported some results in treating tuberculous empyema. In the past four years reports by Sillig and Lang,[29] Matson,[22,23] Hayes,[14] Bethune,[6] Carmichael,[7] Davis,[10] Pollock and Skinner,[25] Ross,[26] MacMahon,[20] Ballon,[3] Bacon,[2] Josewich,[16] and McCarthy[19] have appeared. Matson's report in 1932,[23] based on his experience with one hundred cases, is the most detailed and comprehensive. He has been the most outstanding proponent of oleothorax in the United States and a very sane one.

---

*Read before the Minnesota Academy of Medicine, February 13, 1935, and Mayo Clinic Week, March 8, 1935.

Three oils have been used for oleothorax. Bernou began with gomenolized olive oil. Gomenol is a volatile, aromatic oil, colorless to slightly yellow, and is produced by distillation of the leaves of Melaleuca Viridi-flora, a member of the myrtle tree family found in Gomen, New Caledonia. It has been found non-toxic for animals and is presumably so for man though Matson raises a pertinent question in this regard, having had three cases of acute toxic nephritis for which gomenol may have been responsible. Later paraffin oil with gomenol was used, as the mixture is absorbed more slowly. Cottonseed oil (Wesson) is advocated by Bethune, as it is cheap, pure, bland and neutral. Many men are now using paraffin oil without gomenol or other similar substances. Gomenol has been used particularly in empyema cases with the thought that it was bacteriocidal or inhibitory to the growth of the tubercle bacillus. One finds conflicting views in this regard. Clerc[9] for instance concluded it has a marked inhibitory effect on the growth of the acid-fast bacilli and less so with the staphylococcus. Chandler and Gloyne[8] feel gomenol has no bacteriocidal qualities against tubercle bacillus. Josewich has discarded gomenol altogether, using cajeput oil in a new colloid preparation which he claims is superior to other oils, being less irritant and less toxic, and, being less viscid, goes through a small needle.

The effective action of a noncompressible substance like oil in blocking an obliterative pleuritis is readily appreciated. Likewise the comparatively constant compressing effect of oil on cavities, for instance, in contrast to air, whose pressure intrapleurally varies a great deal between refills, is also understandable. Not clearly understood, however, is the curative effect of oleothorax upon tuberculous empyema. Bernou thinks that, aside from any antiseptic action of gomenolized paraffin or olive oil, some proteolytic activity must play a part. Sergent and Turpin feel that the irritative effect on the pleura is the dominant factor. There are also reasons for assuming a lipolytic ferment action with perhaps direct action of lipases upon the waxy capsule of the tubercle bacillus. At any rate it is obvious that the true action of oleothorax on tuberculous empyema is obscure.

Experimental oleothorax has revealed some interesting findings. Goldenberg and Flanchik[12] concluded from their work with rabbits that both olive oil and paraffin oil produce an inflammatory reaction in the pleural cavity and that this is more marked with olive oil, which also is absorbed more rapidly. Furthermore they noted that olive oil undergoes marked physico-chemical changes in a short time whereas paraffin oil does so only after a prolonged interval. Paraffin oil, they believe, is preferable to olive oil for oleothorax. Saley, Willis and Ellwart[27] using paraffin and cottonseed oil alone, or with 1 to 5 per cent gomenol, found adhesion formation constantly present. Paraffin oil was not absorbed while cottonseed oil tended to be absorbed some weeks after injection and with this adhesions became fewer. They likewise attempted ascertaining if the oil migrated from the pleural cavity. Tieman's soluble blue was added to the oil for this purpose but in one animal only was the dye found to have migrated and in this one instance to the retromanubrial nodes. "Amfetin" (E. Lilly) was added to oil to note whether adhesion formation could be prevented but the only result observed was an apparent diminution in the amount of oil found.

The technic of establishing an oleothorax is not difficult. Some men have devised more or less complicated equipment consisting of bottles, tubing, four-way stopcocks, etc. Aside from the small syringe and needles necessary for anesthetizing the chest wall, I have found that a 20 c.c. and a 50 c.c. syringe with a two-way stop-cock and several needles ranging from 18 to 10 gauge are quite adequate. When a tuberculous empyema is being treated, as much fluid as possible should be first aspirated, the pleural cavity washed out with normal saline and for the first injection not more than 10 c.c. of gomenolized (2 to 5 per cent) paraffin oil injected into the pleural cavity. It has been my practice to repeat this order of procedure at weekly intervals, increasing the amount of oil each time until the pleural space is nearly filled. Until fluid formation has stopped, a pocket of air should be left to act as a cushion against increasing pressure produced by effusion. In using oleothorax for inhibition and compression purposes I have been using plain paraffin oil. Here one must be still more careful in beginning to replace air with oil in order to obviate local and general reactions, which can be very severe. An initial injection of 2 c.c. of oil, doubling the amount with each subsequent treatment, is a safe rule, but despite this care very occasionally reactions will occur. The time interval between oil injections for these indications must be judged with each case.

Of utmost importance during the conversion of a pneumothorax to an oleothorax is close attention to intrapleural pressure. With each syringeful of oil injected a like amount of air should be withdrawn. As long as air is present the pressure can be readily obtained with a water manometer but with the pleural cavity filled with oil, accurate estimation of the pressure is difficult. Oil manometers have been devised but are not satisfactory. A simple and safe method is to observe whether oil returns through the needle and to stop injecting as soon as it does. By following this method I have had no difficulties which could be attributed to high intrapleural pressure.

The dangers one might encounter in producing an oleothorax are rupture of the lung and pleuro-cutaneous fistula. Both are caused as a rule by high intrapleural pressure. Oil embolism has also been reported. None of my patients has developed lung perforation nor have I encountered oil embolism. The one unsuccessful empyema case in my present group was complicated by multiple chest wall fistulæ before oleothorax was begun.

The complications which may arise during thi type of therapy are febrile episodes of varyin intensity, chest pain of different degrees and th formation of fluid under the oil which may b either serous or purulent. Paraffinomas als may occur. Two patients reported in this serie had febrile and local reactions, one so severe an repeated that oil injections had to be discontinued. In two patients serous fluid forme under the oil but subsided after several aspirations. In one instance a purulent effusion forme under the oil and upon aspiration of all fluid an oil this situation was controlled. Paraffinoma have been conspicuous by their absence in my experience.

In addition to these dangers and complication one encounters the additional disadvantage o pleural thickening, especially if oil has been i the pleural cavity for several months. Thi pleural hyperplasia renders roentgenological examination of the parenchymatous lesion mor difficult and, if marked, valueless. Furthermor it is quite probable in certain instances th pleural thickening may become so pronounce that expansion of the lung will be prevente and thoracoplasty eventually indicated.

The duration of an oleothorax is variable a it is in pneumothorax cases. Probably a goo average is five years. Some workers in treatin empyemas favor aspirating the oil as soon as th effusion stops and re-establishing pneumothorax Others maintain the oleothorax for the require period of collapse, which seems to me the procedure of choice because of the marked tendenc toward a contracting pleura following empyema

My personal experience with oleothorax i limited to twenty cases. This series include seven instances of tuberculous empyema fo which 2 per cent gomenol in paraffin oil wa used. Six of these were uncomplicated at the onset by a secondary infection and of these, five were controlled. In the one fatal case multiple pleural cutaneous fistulæ had developed before oleothorax was begun and overwhelming secondary infection followed. The treatment of the patient with tuberculous empyema with secondary infection of hemolytic staphylococcus and staphylococcus aureus was a brilliant success. Eight of the twenty cases were treated with paraffin oil alone because of a contracting pleura which threatened to induce premature expansion of the lung. Of these eight, six were successful. One of the failures in this group was due to marked and repeated febrile and painful reactions from the injection of 1 to 2 c.c. of oil, necessitating discontinuance of the injections. The other failure is waiting for thoracoplasty. Five cases were for compression purposes where pneumothorax or pneumothorax and phrenicectomy combined had failed. In this group there were three successes and two failures.

RESULTS OF 20 OLEOTHORAX CASES

Indications	Total Number	Number Successful	Number Unsuccessful	Per cent Successful
Tuberculous Empyema	7	6	1	85
Contracting Pleura	8	6	2	75
Compression	5	3	2	60

I am well aware of the fallacy of attempting to prove the virtue of any therapeutic measure by a small series of cases but the consistent manner in which these results agree with other larger series is at least significant. My percentage of successful results with tuberculous empyema is unusually high, the average in the literature being between 50 and 60 per cent, but I presume as my cases grow in number this will automatically adjust itself. With this thought in mind it must be conceded that repeated aspirations alone have controlled many tuberculous empyemas. It is my distinct impression, however, that oleothorax not only produces a higher percentage of successful results but achieves this goal in a much shorter time.

Discussion

I am convinced from a study of the literature and my personal experience that oleothorax deserves a recognized but limited place in the field of collapse therapy for lung tuberculosis. It distinctly is not a type of treatment to be used by the inexperienced but rather is one which requires most careful selection of cases, meticulous attention to details while it is being instituted, and close follow-up care. There is much to be learned regarding the eventual results of introducing a foreign substance, even though it be bland and neutral, into any of the serous cavities of the body. Further experimental study is highly desirable as the only substantial fact so far elucidated, aside from the absorbability of the various oils, is that these oils produce pleural inflammation with subsequent thickening and adhesion formation. It would be well to know what happens to the oil that is apparently absorbed. What is the effect, if any, on liver, spleen and kidney from prolonged retention in the body of substances like gomenol and cajeput oil? Why does oleothorax clear up a tuberculous empyema in one case and produce a purulent effusion in another? What is the exact action of oil in controlling any empyema—a truly disinfecting one because of the added substances like gomenol or is there some obscure physicochemical action rendering the pleural cavity and its contents a poor culture medium?

Despite our deficient knowledge along these lines, for the moment I am satisfied certain persons have been restored to health and a working capacity by oleothorax. Their time of residence in the hospital has been shortened and they have escaped major surgical interference.

Conclusions

1. Experience with oleothorax in twenty cases of pulmonary tuberculosis is reported.
2. Six of seven patients with tuberculous empyema were controlled. Six of eight cases of contracting pleura were successfully blocked. Three of five instances needing constant compression responded well.
3. Pleural-pulmonary perforation, lax mediastinum and pneumothorax replacement do not occur in this series.
4. Despite obvious deficient knowledge concerning oleothorax, the procedure has a definite though limited field in the treatment of tuberculosis of the lungs and should be used only by those having a large pneumothorax experience.

References

1. Archibald, Edw.: A note on compression of the lung by paraffin oil in the pleural cavity. Am. Rev. Tuberc., 6:898, 1922-3.
2. Bacon, H. P.: Treatment of empyema complicating collapse of Lung. Med. Bull. Vet. Admin., 10: 302, (April) 1934.
3. Ballon, H. C.: Some experiences with oleothorax. Am. Jour. Surg., 16:1, 1932.
4. Bernou, A.: L'oleothorax therapeutique. Bull. de l' Acad. de Med., 1922.

5. Bernou, A.: Oleothorax: La Presse Med., No. 58, (July) 1932.
6. Bethune, N.: Cottonseed oil in progressively obliterative artificial pnéumothorax. Am. Rev. Tuberc., 26:763, 1932.
7. Carmichael, D. A.: Oleothorax treatment of purulent tuberculous effusion. Can. Med. Assn. Jour., 27:160, 1932.
8. Chandler, F. G., and Gloyne, S. R.: Oleothorax, Tubercle., 7:563, (Sept.) 1927.
9. Clerc, J.: Quoted by Matson.
10. Davies, W. J.: Use of Gomenol. Am. Rev. Tuberc., 24:263, 1931.
11. Fontaine, J.: Result de cent oleothorax. Rev. de la Tuberc., 9:796, (Oct.) 1928.
12. Goldenberg, I., and Flanchik, S. I.: The superiority of mineral oil over olive oil in oleothorax—Experimental studies. Am. Rev. Tuberc., 26:754, 1932.
13. Hayes, J. N.: Purulent tuberculous effusions in artificial pneumothorax. Am. Rev. Tuberc., 16:680, 1927.
14. Hayes, J. N.: Dangers and complications of oleothorax. Jour. Thorac. Surg., 2:34, 1932.
15. Hayes, J. N.: Oleothorax. Journal-Lancet, 54:258, (May) 1934.
16. Josewich, A.: Simplified oleothorax. Minn. Med., 16:512, 1933.
17. Kuss, M. G.: Technique des oleothorax. Rev. de la Tuberc., 7:101, (Feb.) 1926.
18. Kuss, M. G.: Rapport sur l'oleothorax, Rev. de la Tuberc., 9:714, (Oct.) 1928.
19. McCarthy, C. K.: Oleothorax. Am. Rev. Tuberc., 30:677, 1934.
20. McMahon, B. T.: Therapeutic pleural effusions by oleothorax. Am. Rev. Tuberc., 26:424, 1932.
21. Marie, J.: L'oleothorax. Louis Arnette, Paris, 1929.
22. Matson, R. W.: Oleothorax. Trans. Nat. Tuberc. Assn., 1931.
23. Matson, R. W.: Oleothorax. Am. Rev. Tuberc., 25:419, 1932.
24. Morin, J., and Bouessee, F.: Apropos de l'oleothorax. Ann. de Med., 25:330, (April) 1929.
25. Pollock, W. C., and Skinner, R. B.: Oleothorax therapy. Jour. Thorac. Surg., 3:12, (Oct.) 1933.
26. Ross, E. L.: Oleothorax. Canad. Med. Assn. Jour., 29:171, 1933.
27. Saley, D. H., Willis, H. S., and Ellwart, L.: Studies in experimental oleothorax. Trans. Nat. Tuberc. Assn., p. 141, 1934.
28. Sergent, E., and Turpin, R.: Le traitement des epanchement purulents tuberculeux de la plevre. Arch. Med. Chir. Appar. Respirat., 4:48, 1929.
29. Sillig, C., and Lang, M. C.: Oleothorax—The value of intrapleural injections of olive oil in certain phases of pulmonary tuberculosis. Am. Rev. Tuberc., 22:725, 1930.

THE SAFENESS OF ARTIFICIAL PNEUMOTHORAX AS THERAPEUTIC TREATMENT IN PULMONARY TUBERCULOSIS

D. R. HASTINGS, M.D.

Minneapolis

THAT hazards and even dangers attended the administering of artificial pneumothorax in the days when the treatment was first used effectively is an accepted fact; but it is also true that in most sanatoria and clinics today there are comparatively fewer and relatively less serious complications resulting from artificial pneumothorax treatment. This can be proven by the following analysis of clinical reports.

The Glen Lake Sanatorium, since 1927, has maintained a clinic which is held regularly every Thursday morning at the Out-Patient Department of the University of Minnesota. Two physicians, members of the staffs of both the University of Minnesota Department of Medicine and the Out-Patient Staff of Glen Lake Sanatorium are in attendance. Refills only are administered here as all patients discharged from Glen Lake Sanatorium have had their treatments instituted at the Sanatorium.

From November 1, 1927, to October 1, 1934, treatments were given to 110 ex-patients from the Sanatorium. The number of visits approximated 4,019. On October 1, 1934, 56 patients were receiving refills regularly through this department. The 110 patients received 3,847 actual refills over this period, for in 231 instances air was not given either because it was unnecessary or because complications made it impossible, while 59 were bilateral refills.

It is noteworthy that out of 110 cases receiving 3,847 refills, only five individuals had reactions. Two of these patients experienced reactions at two different times, making a total of seven reactions. One patient felt weak and dizzy shortly after receiving air and did not feel well for several days afterwards. Another patient ran a temperature of 103 degrees and felt very uncomfortable for three or four days after receiving a refill. The temperature, which gradually abated, was experienced again in a smaller degree after the next refill. Soon after this she developed fluid in the pleural cavity. Another patient reported considerable pain after a refill, but this, too, gradually disappeared. Some months later this same patient felt weak and nauseated for a short time. In another case considerable pain over the precordium was felt for some time after receiving pneumothorax. One woman had a fainting sensation immediately after receiving bilateral pneumothorax. However, since her pulse was normal and no chest pain was experienced, the reaction was believed to be entirely hysterical.

It is very possible that the above cases do not represent all the reactions experienced by the patients. Although the patients are encouraged to report any slight discomfort experienced after treatment, unreported reactions may occur when the patient is away from the clinic. However, it is believed that almost all reactions were reported.

Five accidents in four individuals were recorded in administering the 3,847 refills. In one case a subcutaneous arteriole was severed and bled, resulting in a hematoma under the skin in the axillary region. The chest was bandaged tightly with a cotton pad over the hematoma. The patient's condition was normal. About a month later the same complication recurred, but it was treated as before, and the patient's condition remained normal.

In another case fluoroscopic examination after the administering of air did not show a pneumothorax. Apparently the parenchyma of the lung had been punctured. The patient expectorated about one ounce of blood and no further attempt to inject air into the pleural cavity was made that day. The patient did not seem to suffer any after-effects.

Appearances are often deceiving and a minor pneumothorax accident may sometimes look like a major catastrophe to the patient. For instance, in another case the needle evidently struck an adhesion and blood vessel, and the patient expectorated blood. Upon the occasion of another refill about six months later, the needle drew blood, and after the needle was withdrawn the patient coughed up some blood. But no ill effects were suffered by the patient on either occasion.

In the final case the patient raised blood-streaked sputum after receiving a refill. This condition soon ceased, however.

It can readily be seen that these accidents were of a minor character and the percentage was almost negligible. This fortunate fact gives evidence of the comparative safety of administering artificial pneumothorax treatments.

Only those patients reporting for a period of three months or more are considered in a more detailed report of the cases attending the clinic. No conclusive data can be drawn from an observation period of less than three months.

From November 1, 1927, to October 1, 1934, a total of twenty-four individuals reported for artificial pneumothorax treatments for a period of less than three months. The records show one patient reporting for less than three months in whom pneumothorax treatments had to be discontinued because of adhesions. Treatment was dropped six years ago and the patient is in good health at the present time.

Table I shows the disposition of these twenty-four cases and also includes the group reporting for a period of three months or more. Of the nine cases readmitted, six had originally been discharged from the Sanatorium as only "improved" cases; two of these had deserted, two left against advice, another was transferred to the General Hospital for special treatment, and the sixth was transferred because of insanity. Of the other three patients, two were discharged as arrested, recommended, and the third was a quiescent case to whose discharge the medical staff acquiesced. When one of the arrested cases started working soon after discharge, symptoms reappeared. Even when the work was lightened, coughing and raising persisted, although to a smaller degree. A little later the patient began to raise blood-streaked sputum and to suffer from dyspnea, notwithstanding the fact that the x-ray showed no change except a slight re-expansion of the collapsed lung. But, because of the symptoms, it was considered advisable to re-admit him. He improved immediately with bed rest. An x-ray taken some time after discharge of the other arrested case showed a possible spread of the disease in the other lung. The patient discharged as quiescent developed a new lesion in the apex of the uncollapsed lung.

TABLE I. DISPOSITION OF CASES REPORTING FOR REFILLS

November 1, 1927, to October 1, 1934

Disposition of Cases	Reporting less than 3 months	Reporting for more than 3 mo.	Total
Current	5	51	56
Readmitted	9	10	19
Discontinued	1	3	4
Priv. Phys.	5	15	20
Moved	4	4	8
Dead	0	3	3
Total	24	86	110

The above 24 patients made 121 visits to the pneumothorax clinic, receiving a total of 125 actual refills. This leaves a total of 3,733 actual refills for the remaining 86 individuals to be studied. In the remaining part of the paper reference is made only to the 86 patients who reported for a period of more than three months.

Of these 86 patients who reported for three months or more to our pneumothorax clinic from November 1, 1927, to October 1, 1934, 51 were current cases at the end of the period of study. In addition to the 10 patients shown as having been readmitted, 7 other patients have been readmitted and discharged. Four of them are included in the 51 current cases, one is now going to a private physician, one has left the city, and one is deceased. The average period of treatment from the Out-Patient Department for the whole group was 19.1 months.

The group of 86 was composed of 47 females and 39 males. The female cases ranged in age from 20 to 59 years, with an average of 33.0 years, while the male age range was 17 to 57, with an average of 31.8 years. Combining the male and female groups, the average age was 32.5 years.

It is interesting to note the refill intervals of the patients. In 43 of the 86 cases there were no changes in intervals over the period of observation, while 43 cases showed a lengthening of intervals which varied from one to four weeks. In no case was there a shortening of the interval.

Fifty cases showed no apparent change in the size of collapse, while 24 showed an increase in collapse and 12 showed a decrease in the amount of collapse. Among the 12 cases which showed a decrease in the amount of collapse we find 3 patients who were readmitted, 2 with whom treatment was discontinued because of inability to enter the pleural cavity, and in another case the patient who had left town for several months (during which time refills had not been given) had almost lost his collapse on return to the clinic.

There were 7 cases which showed possible or definite spread in the uncollapsed lung. Five of these patients were readmitted to the Sanatorium, while the other two took bed rest at home.

A study of fluid, adhesions, and hernia discloses that 38 patients, or 44.2 per cent of the 86 cases, had fluid which appeared at some time during the period of observation. In only one case, however, did the fluid contain pus.

In 67 persons, or 77.9 per cent of the cases, adhesions were recorded, only 2 of which interfered seriously with the collapse treatment. These figures are given in Table II. A mediastinal hernia was found in two cases, while in nine, or 10.5 per cent of the cases, no complication of any kind was recorded.

TABLE II. FLUID, ADHESIONS, AND HERNIA FOUND IN 86 CASES UNDER OBSERVATION

	Number	Per Cent
Fluid	38	44.2
Adhesions	67	77.9
Hernia	2	2.3

Aside from the 17 patients readmitted to the Sanatorium for further care, there were 5 in whom pneumothorax treatments were not so satisfactory as they might have been. Two of these five patients had a spread in the uncollapsed lung, and, although not readmitted to the Sanatorium, were on bed rest at home. Two other patients were forced to discontinue pneumothorax treatments because of inability to enter he pleural cavity. One of these two patient had een receiving pneumothorax refills for a coniderable time so that the re-expansion of the ollapsed lung has not had any ill effects as yet. he prognosis in the other discontinued case is ncertain at this time. The fifth patient died ery suddenly of pulmonary tuberculosis. His neumothorax collapse, however, was satisfacory to the end.

A study of the above 22 patients in whom the reatment was not entirely successful shows that nly 8 of them were discharged from the Sanaorium as arrested cases, while 3 were quiescent, improved, and 2 unimproved. Also 4 of the ischarges were given permission to leave, 3 deerted the Sanatorium, and 5 left against advice. f the 8 arrested cases, 3 showed a spread in the ncollapsed lung. One, a bilateral case, developed influenza, which was followed by the reapearance of tuberculosis symptoms together with onsiderable fluid. Fluid also appeared in another case, and the patient showed a marked loss f weight. And in another, fluid appeared and ymptoms became manifest again, no doubt due o the careless mode of living. The seventh paient was readmitted because of a hemorrhage which occurred 10 days after her refill; however, he patient stated that she had been in a general run-down condition for some months previous to this occurrence. The eighth case was that of the patient who died very suddenly of pulmonary tuberculosis.

In the remaining 14 cases of the 22 cases which were not arrested we find adhesions causing the discontinuation of refills in 2 patients, spread in the opposite lung in 4 instances, 1 patient who had been discharged only for the summer and was readmitted in the fall, 1 readmitted for only a short time because of pneumonia, and 2 patients in whom fluid appeared and in whom symptoms reappeared, 1 patient readmitted because of pregnancy, 1 because collapse had never closed the cavity, 1 readmitted because of streaking, and the last one was readmitted to finish working up on exercise.

There remain the second and third patients tabulated as being dead, and the one in whom pneumothorax was discontinued. One of the two deceased patients committed suicide, while the other died of non-tuberculous pneumonia. The patient who discontinued pneumothorax six years ago did so against the physician's advice and is now applying for readmission to the Sanatorium.

Although it is impossible to say what the ultimate outcome of these cases will be, I believe that their histories point to the comparative safety in the administering of refills and to the ever-increasing use of artificial pneumothorax treatment in pulmonary tuberculosis. This statement is based upon the conclusive study of the 110 cases receiving 3,847 refills over a period of 83 months. Only 5 individuals had 7 reactions, and only 5 accidents, very minor in character, were experienced.

CHRONIC ULCERATIVE COLITIS AMONG ELDERLY PERSONS

JOHN C. M. BRUST, M.D.,* and J. ARNOLD BARGEN. M.D.†
Rochester, Minnesota

THE presence or absence of disease of the large intestine can almost always be determined from anamnesis and a careful physical examination. The differential diagnosis of chronic ulcerative colitis and other diseases of the intestine, however, is more difficult and requires methods of precision. Such symptoms as rectal bleeding, abdominal pain, diarrhea, and constipation will in most instances direct attention to the large intestine; however, gross and microscopic examination of the stool, sigmoidoscopy, and frequently roentgenologic visualization of the colon after barium enema, will be essential for correct differential diagnosis.

To emphasize these statements, we would cite cases in which obstructive carcinoma of the rectum produced diarrhea, constipation accompanied amebic infestation of the colon, or severe, chronic ulcerative colitis seemed to produce very few and slight symptoms. Within the past year we were afforded an opportunity of examining four individuals more than sixty years of age who were found to be suffering from chronic ulcerative colitis. We were impressed with the mildness of the subjective complaint when we later observed the extent of the pathologic changes that had taken place in the colon. Chronic ulcerative colitis as a rule produces a very definite train of symptoms, which includes bloody diarrhea of great severity, tenesmus, abdominal cramps, loss of weight, and anemia.

---

*Fellow in Proctology, The Mayo Foundation, Rochester, Minnesota.

†Division of Medicine, The Mayo Clinic, Rochester, Minnesota.

It was this disparity between the disease as it usually is encountered among young adults and as it was noted in the cases of these four elderly persons that prompted us to review the records of all patients at The Mayo Clinic, from 1924 to 1932, inclusive, who were more than sixty years of age and who were found to be suffering from chronic ulcerative colitis. In this period of nine years a diagnosis of chronic ulcerative colitis was established in a total of 1,291 cases. Only twenty-five of the patients were more than sixty years of age, or 1.9 per cent of the total. Chronic ulcerative colitis was seen most frequently among patients between the second and fourth decades of life.

Of these twenty-five elderly patients, sixteen were males and nine females. Four were more than seventy years of age, and the remaining twenty-one were between sixty and seventy years of age. All twenty-five patients had been seen by their family physician prior to their coming to the clinic, and the existence of a malignant condition of the large bowel had been suspected. Curiously enough, most of the patients themselves feared that carcinoma was developing. To illustrate the deceptive character of the symptoms it should be stated that, after the history had been obtained and physical examination made, a diagnosis of colonic carcinoma was thought to be most likely; use of the sigmoidoscope was required to prove the presence of chronic ulcerative colitis. The reason for this error in judgment is obvious. Any person more than sixty years of age who presents a story of change in intestinal habits associated with rectal bleeding and with vague abdominal distress, is immediately suspected of harboring a neoplasm within the large intestine.

The symptoms of these elderly patients were not as a rule characteristic of chronic ulcerative colitis. A rather mild diarrhea was mentioned and bleeding, although fairly constant, was usually not profuse. The debilitating tenesmus, loss of weight, anorexia, and intractable, bloody purulent rectal discharges were seen in only four of the twenty-five cases. In fact it seems safe to assert that were it not for a perfectly natural dread of carcinoma, many of these older persons might easily have avoided seeing any physician. Periodicity in the diarrhea, the mildness of this symptom, the relative absence of abdominal cramps, slight if any loss of weight, and in four instances actual constipation, all militated against any suspicion of chronic ulcerative colitis. Even in cases in which the patient complained of constipation, bloody rectal discharges occurred.

The duration of these symptoms was variable being from two weeks to three years. Following sigmoidoscopic examination, however, a careful probing into the past history was invariably attempted, and in most cases revealed that a certain amount of diarrhea of a periodic type had existed in a mild form for many years. One man stated that he had had slight diarrhea lasting for a day about every two months, but that constipation was his usual trouble. Rarely had previous attacks of diarrhea been persistent in such cases, although six of the patients had suffered from them off and on for more than eight years. Even in these cases, however, debility, wasting, and anemia were not found on physical examination. In fact, for the most part, despite the nature of the disease and the ages of the patients, their general condition was surprisingly good. Only five presented evidence of marked anemia. All were ambulatory and only two exhibited febrile reactions.

In distinct contrast to these rather inconstant and indefinite symptoms were the findings revealed by the sigmoidoscope. By this means of examination a very clear cut and unmistakable picture was observed in all cases. The characteristic red, granular mucosa, which bled easily when touched with a cotton swab, was present. The ulcerative process was an active one in nearly all cases, and to all intents and purposes the picture was usually one that has been described as typical of active, chronic ulcerative colitis. Contraction of the rectal and sigmoidal lumen was rather marked in nine of the cases, was slight in seven, and in nine cases there was evident contraction. Curiously, the very com- on complication of polyps was not seen in any the cases. Carcinoma, which is a complication about 2.5 per cent of cases of chronic ulcera- ve colitis, was observed in one case. As has een noted in previous reports, this superimposi- on of malignant growth on an ulcerated colon is ot common; when it does occur, it usually does among young adults, and the malignancy al- ost invariably is of high grade. We must con- ude that when chronic ulcerative colitis occurs nong elderly patients, it exhibits no more arked neoplastic trend than it does among ounger patients.

Roentgenologic studies of the colon, using the arium enema, were diagnostic for chronic ul- erative colitis in seventeen of the twenty-five ases. In eight cases there was no roentgenologic vidence of pathologic change above the sigmoid, hich is an unusually high percentage. In seven ases the disease appeared roentgenologically to e confined to the descending or sigmoid colon. t is thus apparent that in fifteen of the twenty- ve cases the disease was localized in either the ectum, the sigmoid, or in the descending colon. n the remaining ten cases, chronic ulcerative olitis involved the entire colon. This tendency of he disease in older patients to be rather limited n its extent may aid in explaining the relative nildness of the symptoms.

On the establishment of the diagnosis, imme- liate and energetic treatment was begun along he lines previously described by Bargen. This onsists of: (1) immunization, vaccination, or lesensitization against the offending diplo-strep- ococcus; (2) removal, if practicable, of all dis- ant foci of infection; and, (3) institution of roper feeding. This treatment, combined with eneral supportive measures, resulted in a rather remarkable series of responses among these lderly persons. In the early years of this form of treatment it was felt that older persons would not be much aided by any measures. Gradually our ideas along these lines have changed, and we now feel, in the light of our observations, that a fairly happy prognosis may be offered. Care must be exercised in administering the specific antibody solution or the vaccine, as severe reactions seem to be more common among these older patients.

The immediate response of these patients was frequently rather dramatic. Twenty of the twenty-five were improved greatly within two weeks from the beginning of treatment and were sent home, where administration of vaccine was continued by the family physician. Of the remainder three responded slowly but left for home within four weeks definitely improved; and two responded poorly and went home little improved.

Further data were obtained in twenty-two of the twenty-five cases. One patient had died three months later of carcinoma of the colon. One had died of a stroke two years after dismissal; she had not had any intestinal symptoms for a year prior to her cerebral accident. Of the twenty patients known to be living, thirteen were entirely free of symptoms after an elapsed period of at least two years. Two had had mild exacerbations and had returned to the clinic for further observation and treatment. Improvement was immediate. Three wrote that they were still having some mild diarrhea but were feeling well. Two were not improved, despite fairly rigorous treatment with vaccine at their homes. As might be expected, patients with involvement of the distal segments of the colon did better than those whose entire colon was diseased.

Comment

Chronic ulcerative colitis among patients more than sixty years of age, although rare, does exist and, when seen, the symptoms are usually deceptively mild. Careful investigation of the entire colon must be undertaken as coexisting carcinoma may be present. Sigmoidoscopy is the diagnostic agent "par excellence."

Treatment along specific lines must be begun at once, since the response is gratifying and dangers are minimal. A splendid eventual outcome, although not invariable, is usually attained among older patients suffering from chronic ulcerative colitis if proper treatment is instituted.

THE MODES OF ONSET OF SYMPTOMS OF CARCINOMA OF THE STOMACH*

DWIGHT L. WILBUR, M.D.
Rochester, Minnesota

A THIRD of the carcinomas of men and a fifth of the carcinomas of women occur in the stomach, and it is estimated that 38,000 persons die each year in the United States from carcinoma of that portion of the body. Of the patients with carcinoma of the stomach who come to the clinic, 50 per cent have clearly inoperable lesions, and of the remaining 50 per cent who are operated on only half (25 per cent of the total) have resectable lesions. These facts emphasize the importance of this disease.

It is constantly being said that there are two ways in which this high mortality may be reduced: first, by earlier diagnosis, and, second by earlier surgical eradication of the growth. Apparently the immediate future holds no other means of probable success.

Since, at present, early diagnosis holds the key to the partial solution of this problem, it has been thought worth-while to emphasize some of the ways in which carcinoma of the stomach may begin. If one is on the lookout for the disease and is familiar with its early symptoms, one is more likely to insist on roentgenologic examination of the stomach, for the expert roentgenologist is able to detect most of these lesions at a stage when they are still resectable. If any hope lies in surgical intervention, it is early in the disease; in fact, at times before an accurate clinical diagnosis can be made, for by the time definite diagnosis can be made it is often too late to resect the lesion.

The mode of onset of symptoms of carcinoma of the stomach depends in large part on the pathologic type and situation of the lesion and, to some extent, on the reactivity of the individual (whether he is hypersensitive or hyposensitive). Lesions which exist near the pylorus will more likely lead to obstruction, whereas those high in the fundus of the stomach will more often produce anemia, loss of weight and strength, and vague dyspepsia.

There is no recognizable type of person more likely to have carcinoma of the stomach than another. The disease occurs often among persons with a normal constitution and those apparently in perfect health and with good digestion. Occasionally, a patient with the disease gives a history that many members of the family have died of carcinoma, but the reverse is true also, and little diagnostic reliance should be placed on these facts. It should be recalled that age is no barrier to this disease. In fact, in one of nine cases of carcinoma of the stomach the patient is less than forty-five years of age and, up to 1930, at the clinic, in 250 cases of carcinoma of the stomach patients were less than forty years of age.

Typical History

Associated with the most common mode of onset of the disease is the so-called typical history. Unfortunately, this is only too commonly emphasized as the usual history of the disease. I say "unfortunately" because so often, when the symptoms are clear cut, the disease already is hopelessly advanced. The characteristics of this typical history are as follows: the patient, usually middle-aged, gives a history of perfect digestion until the gradual or rapid onset of dyspepsia, which is characterized by anorexia, fullness and discomfort after meals, belching, burning, nausea and, occasionally, by vomiting with loss of weight and strength. The story usually is of a progressive condition, and not infrequently the patient is emaciated and palpates an abdominal mass before consulting his physician.

I should like to call attention to the frequency with which symptoms begin following an apparently acute infection with loss of weight; "flu," or "intestinal flu" as the patient often describes it. The factors responsible for this sequence are not quite clear.

The significant points to recall are the previous history of good digestion, especially if the patient is middle-aged, with onset for the first time of progressive continuous dyspepsia which may have produced a decline in general well-being.

---

*From the Division of Medicine, The Mayo Clinic, Rochester, Minnesota

Ulcer Type History

Carcinoma of the stomach not infrequently begins with symptoms like those of peptic ulcer. The history may be of long or short duration. It should be pointed out that this does not mean that the carcinoma developed in an ulcer, but the occurrence of symptoms suggesting ulcer may mislead one from the correct diagnosis. According to Eusterman and Kirklin, about a fourth of resectable carcinomas of the stomach simulate peptic ulcer, especially at the outset. When a patient past middle age presents a short history of ulcer type, one should be on the lookout for carcinoma. Similarly, suspicion should be aroused if there is loss of weight and strength out of proportion to reduction in intake of food.

When the history of ulcer type is long, one should suspect the development of a complication, of associated disease, or of carcinoma, if there occur (1) disappearance of intermittency of exacerbation of symptoms with substitution of a continuous or remittent clinical course, (2) irregularity, diminution, or disappearance of pain-food-ease sequence, (3) substitution of usual distress by a dull ache, more or less continuous, and aggravation rather than ease by alimentation, and (4) nausea and anorexia. In addition, if carcinoma of the stomach is present, the following objective phenomena may be found: (1) lowered gastric acidity, (2) anemia without gross bleeding, (3) occult blood in the gastric contents, and (4) disturbances in motor function of the stomach (Eusterman).

The following cases illustrate the onset of carcinoma of the stomach with symptoms of ulcer of short and of long duration.

Case 1 (short history).—A man, aged sixty-four years, came to the clinic in December, 1933, with a history of good digestion until six weeks previously. At that time a dull burning sensation had developed in the midepigastric region two or three hours after meals, with prompt ease after ingestion of food. Pain had not been present, although the patient had been awakened at night with the distress. His appetite had been good; he had lost 10 to 15 pounds (4.5 to 6.8 kg.). These symptoms had persisted. Physical examination gave essentially negative results except for a questionable mass high in the epigastrium on the left. Laboratory studies revealed a normal hemoglobin content of the blood and achlorhydria with fresh blood in the gastric content. Roentgenologic study revealed carcinoma in the middle third of the stomach. The growth was resected at operation.

The only clinical features in this case suggesting carcinoma of the stomach were the age of the patient, and a relatively short history of dyspepsia following previously good, digestive health.

Case 2 (long history).—A woman, aged forty-two years, came to the clinic March 28, 1934, because of stomach trouble of fifteen years' duration. In the early course of the disease she had had pain high in the epigastrium which had been projected through to the back; this pain had occurred irregularly and usually had been relieved by food. Four years before registration an ulcer type of distress had developed with discomfort two to three hours after meals; this had usually occurred in the spring and autumn, and had been relieved by food and soda. Roentgenologic study at that time had revealed a duodenal ulcer. Three months before admission the pain had become more severe, and with it bloating and epigastric fullness had occurred. There was no loss of weight. On physical examination the patient appeared to be healthy. The concentration of hemoglobin was 86 per cent. Analysis of gastric contents revealed a free hydrochloric acid value of 30 and total acidity of 44. Roentgenologic study disclosed a shallow, ulcerating lesion on the posterior wall of the stomach, near the greater curvature above the angle. At operation, the ulcerating lesion proved to be an adenocarcinoma of grade 4; there was marked glandular involvement.

In this case the finding of the carcinoma at operation was a surprise. The situation of the lesion near the greater curvature on roentgenologic examination, suggested the possibility that it might be malignant, but the sex and age of the patient, the long history of ulcer, and the absence of loss of weight or strength and of anemia suggested a benign lesion.

There has been much discussion as to the probability of carcinoma developing in a gastric ulcer. Without entering into this controversy, it should be made plain that the significant fact is that not infrequently the physician and the roentgenologist are unable to say whether an ulcerating lesion in the stomach is benign or malignant, and occasionally even the surgeon will be misled after gross inspection of the lesion.

Obstruction

Carcinoma of the scirrhous or polypoid type occurring near the pylorus may produce pyloric obstruction early or late in the course of the disease. When symptoms of obstruction arise early, and especially when they are associated with a previous history of ulcer, diagnosis may be difficult if not impossible. One may have to be content with the diagnosis of obstructing lesion at the outlet of the stomach. As Eusterman has pointed out, gastric retention may occur in cases of carcinoma of the stomach without a lesion at the pylorus, and one should think of this diagnosis when there is a residuum in the fasting stomach if barium is not retained after six hours. In addition, he has pointed out that in 60 per cent of cases in which the lesion is resectable and in 40 per cent of cases in which the lesion is small, gastric retention is present.

The following case illustrates this obstructive type of lesion:

Case 3.—A man, aged sixty years, registered at the clinic in December, 1933, because of dyspepsia and weakness. He had been unusually well until three years previously, at which time vague dyspepsia had developed and a diagnosis of duodenal ulcer had been made following roentgenologic study. By following a dietary and medical schedule he had obtained relief of symptoms until a year later, when epigastric pain intermittently in the afternoon and at night had occurred; this had been relieved with food and soda. One month prior to admission the patient had become nauseated in the mornings, and he had vomited food eaten the previous night. This had continued, and he had lost strength, had become fatigued, and was content to sit around all day. He had lost only 8 pounds (3.6 kg.). Physical examination gave essentially negative results except for indicating Paget's disease of the bones. Laboratory studies gave evidence of secondary anemia, the value of hemoglobin being 9.6 gm. per 100 c.c. of blood; after an Ewald meal, free hydrochloric acid was found to be 14, total acidity 24, and the gastric content obtained by aspiration, 500 c.c. Roentgenologic study of the stomach revealed an obstructing lesion of the outlet, probably duodenal ulcer. While under treatment at the hospital, gastric retention continued. At operation, a mass involving the entire pyloric antrum was resected. It proved to be an adenocarcinoma of the colloid type, graded 4.

The clinical diagnosis in this case was pyloric obstruction, probably duodenal ulcer. The only points favoring a diagnosis of carcinoma of the stomach were: (1) age, (2) relatively low values for acidity (not uncommon with an obstructing ulcer), (3) persistence of retention under treatment, and (4) secondary anemia without gross bleeding.

Anemia

Anemia is one of the commonest findings in malignant disease. This is particularly true of malignant disease of the gastro-intestinal tract, and anemia at times is the first and presenting symptom in carcinoma of the stomach. The anemia usually depends on the presence of an ulcerating or polypoid lesion. If this lesion is in such a position in the stomach so as not to interfere with its emptying, anemia may be present before any other symptom develops. The anemia depends apparently on bleeding, which in turn is the result of ulceration into vessels or of necrosis and sloughing of small vessels in the growth. It may be sustained in part by poor nutrition of the individual because of the carcinoma, or it may possibly result from a disturbance in the metabolism of hematopoietic substances (intrinsic factor of pernicious anemia).

Carcinoma of the stomach rarely produces gross bleeding except as a terminal phenomenon. In only 1 per cent of cases does it lead to gross hematemesis, and of those in which patients complain of hematemesis studies at the clinic indicate that in 12 per cent the bleeding is due to this disease.

The relationship of carcinoma of the stomach and pernicious anemia has been studied by Conner and Birkeland, and apparently when the two diseases coexist it is a coincidence rather than because there is a definite relationship between the two. The following report of a case indicates the difficulty in diagnosis presented by patients with carcinoma of the stomach and anemia.

Case 4.—A man, aged sixty-four years, stated that two years before coming to the clinic he had become weak and pallid. A diagnosis of pernicious anemia had been made by the physician at his home; roentgenologic study of the stomach had revealed nothing of significance. Treatment with liver and iron had given a satisfactory result. Later, anemia had developed whenever treatment was stopped for several weeks.

Three weeks before admission, anemia had recurred and, while it responded to the same treatment as previously given, roentgenologic study of the stomach disclosed a gastric lesion. The only history suggesting gastro-intestinal disease was the intermittent occurrence of heartburn, for two years, and occasional brief episodes of vomiting. The patient had lost 6 pounds (2.7 kg.).

Physical examination revealed marked pallor and the neurologic signs of combined sclerosis. The value for hemoglobin was 12.0 gm. per 100 c.c. of blood, erythrocytes numbered 3,280,000 per cubic millimeter, and examination of blood smears revealed morphologic changes characteristic of pernicious anemia. Hydrochloric acid was absent in the gastric juice, and blood was aspirated from the stomach. Roentgenologic study gave evidence of an extensive polypoid lesion of the stomach with lceration. At operation, the lesion proved to be an lcerating polypoid carcinoma, of grade 3, with glandlar involvement.

In this case the symptoms of carcinoma were ninimal, and the lesion was discovered only beause the patient's physician was alert to the ossibility of a gastric lesion as the significant nderlying disease in some cases of marked nemia. This demonstrates the importance of naking a roentgenologic study of the stomach of ll patients with pernicious anemia.

eneral Decline and Nutritional Disturbances

Patients who present themselves because of a eneral decline in health or because of loss of reight and strength not infrequently have carinoma of the stomach even though gastro-intesnal symptoms are absent. Not uncommonly ymptoms may begin with "flu" or with an acute ifection. Anorexia may be the only symptom, r pallor and weakness alone may be present. It important to recall that carcinoma of the stomch may develop in the presence of any chronic isease. In the presence of these clinical sympoms the carcinoma is not infrequently situated the fundus or cardiac portion of the stomach, here it may be difficult to find roentgenologially.

Occasionally, specific nutritional disturbances ill occur as a result of carcinoma of the stomch. Eusterman and O'Leary have emphasized e development of pellagra in association with astro-intestinal diseases, particularly those proucing obstruction.

The following case is one in which the outanding symptoms were those of pellagra and in hich the disease was the result of carcinoma f the stomach.

Case 5.—A man, fifty-eight years of age, came to e clinic because of diarrhea, weakness, swelling of e legs, and sunburn of the hands. One year preiously, dull epigastric distress had developed, with norexia, and loss of weight and strength. Four months reviously, the patient had had three to four lightrown, foul, liquid stools daily. Several roentgenologic udies of the gastro-intestinal tract during this interval ad given negative results. Two months before admison, edema of the ankles had occurred and, five weeks ter, while trying to improve his health by taking sun aths, the patient had become unusually sunburned on e hands and nose. Because of the gastric symptoms, e patient had been on a very limited diet for months. Physical examination revealed the typical appearance of pellagra. The patient was emaciated, and edema of the legs and an epigastric mass were present. The value for hemoglobin was 9.23 gm. per 100 c.c. of blood, and achlorhydria was present. Studies of the blood calcium and serum proteins showed these values to be lower than normal. Roentgenologic study of the long bones revealed some osteoporosis and that of the stomach a carcinoma involving the middle third portion. At exploration this proved to be an inoperable lesion.

Metastasis

Rarely will the outstanding symptoms presented by a patient with carcinoma of the stomach be the result of metastasis. Metastasis generally does not occur early, but occasionally it may be extensive when the original lesion is small. The usual sites of metastasis, the liver, associated lymph nodes, peritoneum, pancreas, pleura, and lungs, are not commonly involved early enough to provoke symptoms before the initial lesion does. If metastasis produces the presenting symptoms, the lesion in the stomach is most likely in a "silent spot" and the metastasis involves a very important organ or region.

The following case illustrates this mode of onset of the disease:

Case 6.—A man, forty years of age, came to the clinic eight months after the onset of anorexia and weakness; he had lost 30 to 40 pounds (13.6 to 18.1 kg.). Four months before admission, vague, low, abdominal cramps with diarrhea had developed, but this had been relieved by medical treatment. At that same time, while walking, stiffness of the left leg and arm had suddenly developed, and for six weeks he had been unable to walk. Some residual stiffness of the leg had persisted. Three weeks before registration, blurred vision, forgetfulness, and childishness were noted On physical examination the following were observed: left homonymous hemianopia, left hemiparesis, mental slowness, and a left Babinski reflex. The value for hemoglobin was 13.1 gm. per 100 c.c. of blood. Achlorhydria was present. Roentgenologic study of the stomach revealed an ulcerating carcinoma of the cardiac portion, and a neurologic diagnosis was made of multiple metastasis to the brain. Death occurred six weeks later.

In this case the predominance of neurologic symptoms could easily have led one to overlook the gastro-intestinal disease.

Comment

It should be emphasized again that the physician must be constantly on the alert for early symptoms of carcinoma of the stomach, since on early diagnosis rests the real hope of cure. Although many patients with this disease present the so-called classical or typical history and findings, so that diagnosis is relatively easy, the lesion in such cases is often inoperable and usually incurable. In those cases in which there are early symptoms and in which only the suspicion of the disease is aroused clinically the roentgenologist will more often find a resectable lesion and therefore one more likely to be curable.

Summary

Carcinoma of the stomach may produce a variety of clinical syndromes in which the predominating symptoms may be: (1) typical, (2) similar to those of ulcer of long or short duration, (3) of pyloric obstruction, (4) of anemia, (5) of general decline in health or of nutritional disturbance, or (6) of metastatic involvement.

The significant clinical features, emphasized by Eusterman, which suggest the occurrence of malignant disease in the presence of a previously known gastric lesion are: (1) disappearance of intermittency of exacerbation of symptoms with substitution of a continuous or remittent clinical course; (2) irregularity, diminution, or disappearance of pain-food-ease sequence; (3) substitution of usual pain or distress by a dull ache, more or less constant, and eventually aggravated rather than eased by alimentation; (4) loss of appetite and onset of nausea even though acids are normal or elevated; (5) loss of weight and strength out of proportion to reduction of intake of food; (6) advanced age and recent development of symptoms; (7) diminished secretion of acid; (8) disturbance of motor function of the stomach; (9) onset of anemia in the absence of gross bleeding; (10) appearance, increase, or persistence of occult blood in the gastric content and in the feces while the patient is on a meat-free diet; (11) residuum in the fasting stomach in the absence of retention of barium at the end of six hours.

A STUDY OF THE MORTALITY OF PREMATURE INFANTS DELIVERED BY CESAREAN SECTION*

E. F. ROBB, M.D.
Minneapolis

WHILE the mortality rate for prematures has been greatly reduced in recent years, there is yet a great deal to be desired in our understanding of this problem. If a premature dies and no definite cause of death is found, he is usually classified as "nonviable," yet it is always difficult to explain just why a well developed, healthy looking premature fails and dies within a few hours or days, while frequently another much smaller, and less promising looking baby, receiving the same care, thrives and gains steadily. During the past two years, we were particularly impressed by the death of two prematures that were delivered by cesarean section because of central placenta previa as a complication of pregnancy. In both of these cases, the babies were well developed and large enough so that they should have been saved. Yet they both died within twelve hours. There was in both cases a marked wax-like paleness, with repeated cyanotic attacks and no other physical findings. Unfortunately, an autopsy was not obtained in either case.

Obstetricians have long recognized that placenta previa, as a complication of pregnancy, offers grave danger to both the mother and the child. Obstetrical literature of recent years furnishes a wealth of statistics on maternal and fetal mortality, along with the statement that the fetal mortality is largely accounted for by prematures. A vast majority of these writers agree that cesarean section offers the best chance of reducing these mortalities. Bill,[2] Von Ammon,[6] King,[4] and many others, covering thousands of cases of placenta previa, show an infant mortality with cesarean delivery of 15-30 per cent and a mortality of from 20-75 per cent with various methods of vaginal delivery. Very few actual statistics on prematures are given.

A review of our records reveals that during the past five years a total of forty-one living infants were delivered by cesarean section at the

---

*Read before the American Academy of Pediatrics, Minneapolis, October, 1934.

University Hospital and Abbott Hospital combined. Six of these infants died. Of these forty-one infants, twelve were prematures with an average birth weight of 2,246 gms. Of the twelve prematures, there were five deaths or a premature mortality of 41 per cent. A survey of all living prematures delivered by vaginal methods in the same hospitals for the five year period reveals that out of 179 cases there were sixty-one deaths, or a 34 per cent mortality. Nearly half of these deaths occurred within forty-eight hours of birth, and the following table demonstrates that the larger the premature and the closer he was to term, the better his chance of living.

TABLE I

Weight	Mortality
Under 1,000 gm.	87.5%
1,000–1,500 gm.	68
1,500–2,000 gm.	42
2,000 gms. or over	17

Quite obviously, percentages on such a small number of cases mean little if anything. However, of the twelve prematures delivered by cesarean section, four were so delivered because of a central placenta previa. Of these four, there were three weighing less than 2,000 grams and all three died. The weights of those dying were 1,180, 1,630 and 1,840 grams. This 100 per cent mortality for the placenta previa group under 2,000 grams may be significant. The two larger ones, at least, should have had a 58 per cent chance to live according to the mortality rate of prematures as a whole of like weight. Clifford,[4] in a rather large series of prematures of all sizes, where placenta previa complicated the pregnancy, found a 50 per cent fetal mortality f delivery was made by cesarean section, and a 70 per cent mortality if by various vaginal methods. He, at the same time, found a 54 per cent mortality for prematures as a whole, even in uncomplicated pregnancy, if delivered by section, and concludes that the high mortality of placenta previa prematures delivered by cesarean is not due to their being potentially less viable, but o other factors. He calls attention particularly o the influence of morphine and anesthesia given with cesarean section, and shows a definite and progressive increase of fetal mortality with ncreased dosage of morphine.

In our cases, the mothers had had no morphine, but let us consider the theory that a lowered blood volume may play an important rôle in the mortality of prematures as a whole and particularly in prematures delivered by cesarean section.

Since speed of operation is essential to the mother in cesarean delivery, it is the custom of obstetricians to clamp and cut the cord immediately upon opening the uterus, delivering the baby at once to an assistant. Schücking, in 1877, and Budin, in 1886, demonstrated, in normal deliveries, that if the cord was ligated immediately after birth an average of 90 c.c. of fetal blood in the placenta was lost to the baby. Schücking's determinations were made by placing the baby on a scale immediately after birth and recording the weight then and again after pulsation in the cord had ceased. He believed that this blood was regained by the baby through placental compression under uterine contraction. Budin's determinations were made by ligating the cord immediately and measuring the amount of blood that escaped from the maternal end of the cord. He advanced the additional theory that this blood would normally be regained by the baby by thoracic aspiration produced by respiration and crying.

Lucas and Deering, using the dye method, found that the fetal blood volume of newborns during the first fifteen days of life varied widely from 107 to 195 c.c. per kilo. If these figures apply to the premature, it would indicate that a premature weighing 1,500 gm. would have a total blood volume of from 160 to 292 c.c., while a premature of 2,000 gm. would have a total blood volume of from 214 to 390 c.c. Bakwin and Rivkin,[8] also using the dye method, obtained even lower figures for blood volume, namely, 71 to 148 c.c. per kilogram. The placenta for a premature is smaller than for a full term baby, and no doubt 90 c.c. is too high a figure for the estimated amount of fetal blood present in the placenta. If, though, we cut the amount in half and use 50 c.c. as an average, it represents a sizeable percentage of the total blood volume, perhaps as high as 33 per cent in some cases. If prematures delivered by cesarean do suffer any such loss in their total blood volume, it is easy to understand why so many become cyanosed and why the mortality is so high during the first forty-eight hours. This theory, it would seem, is further strengthened by our experience in increasing the rate of gain of prematures by giving small amounts of blood during the first days of life and by Hofmeier, Zwekfel and Ribemont's observation that the initial loss of weight in the first few days of life is usually less after late than early ligation of the cord.

Dr. R. T. LaVake, Minneapolis, in discussing this with me has suggested that it would seem feasible and wise to modify the present technic of cesarean section by delivering the baby, cord and placenta intact, to an assistant. If this was done, no haste would be necessary in clamping the cord and mechanical pressure could be exerted on the placenta to facilitate the regaining by the baby of the fetal blood present in the placenta at birth.

To go a step further, if this theory of lowered blood volume as a factor increasing mortality in prematures delivered by cesareans, is sound, it may likewise apply to a degree at least in all premature births. So much emphasis has been justly placed on the necessity of keeping a premature warm, that it seems quite possible that in order to avoid chilling, and in order to establish respiration promptly, in many cases of vaginal delivery, the cord is ligated before pulsation has ceased. The necessity of early ligation of the cord could be largely obviated by providing delivery rooms with rolls of sterile cotton, sterile premature gowns or suitable heat lamps with which to keep the infant warm until all pulsation of the cord has ceased. In those cases, where an early ligation of the cord is absolutely essential, an early intraperitoneal transfusion might be of benefit. It is my hope and belief that if these changes in technic are instituted, a reduction in mortality for all prematures will follow, and especially for those delivered by cesarean section.

References

1. Bakwin, Harry, and Rivkin, Helen: The estimation of the volume of blood in normal infants and in infants with severe malnutrition. Am. Jour. Dis. Child., 27:340-352, (April) 1924.
2. Bill, A. H.: Placenta previa. Am. Jour. Obst. and Gyn., 21:227-233, (Feb.) 1931.
3. Clifford, S. H.: Reduction of the premature infant mortality. Jour. Pediat., 5:139-155, (Aug.) 1934.
4. King, E. L.: The rôle of abdominal cesarean section, especially the low operation in the treatment of placenta previa. Trans. Amer. Assn. Obst., Gyn., and Abd. Surg., 46:219-225, 1933.
5. Lucas, Wm. Palmer, and Dearing, Bradford French: Blood volume in infants estimated by the vital dye method. Am. Jour. Dis. Child., 21:96-106, (Jan.) 1921.
6. Von Ammon, Ernst: Treatment of placenta previa. Ztschr. f. Geburtsh. Gynäk., 97:261, 1923.

THE AMBULANT TREATMENT OF VARICOSE VEINS BY LIGATION, DIVISION AND INJECTION OF THE DISTAL SEGMENT*

M. G. GILLESPIE, M.D., F.A.C.S.

Duluth

A DECADE has now passed since the introduction and popularization in this country of the injection treatment of varicose veins, although it had been used extensively in Europe for a quarter of a century.

This form of treatment became very popular following the stimulus given by such men as McPheeters, de Takats, Homans, Theis, Howard and many others. Large series of cases were reported in the literature and many references accumulated. Various chemical solutions were used extensively, among which were mercury bichloride, sodium salicylate, salt, sugar, and, more recently, quinine and urethane, and sodium morrhuate. Many articles appeared extolling one or the other solution. Gradually, however, some of these solutions became less popular as the quest for the ideal sclerosing solution went on. The mercury solutions were discontinued because of their toxicity. The salicylate and salt solutions became less popular because of the severe pain which they caused and the danger of sloughing when injected outside the vein lumen. The sugar solutions still maintain some of their popularity, but at the present time it would seem that quinine and urethane and sodium morrhuate are the sclerosing agents of choice.

---

*From the Duluth Clinic.

During the first half of this decade the literature contained many references dealing especially with technic, complications and mortality, justifying the method over the older treatment of surgical removal.

Kilbourne in 1929 reported eighteen deaths in 4,607 operations, or one in 250, compared to about one in 5,000 injections. McPheeters, after a very thorough review of the literature, reported a mortality rate from pulmonary emboli of 0.0075 per cent after injection compared to 0.53 per cent after operative treatment.

In 1930 and thereafter the medical literature of varicose veins dealt profusely with results of treatment. The incidence of recurrences varied widely, most authors reporting from 3 to 15 per cent. Others, however, reported less favorably, Howard, et al., in 1931, reporting a recurrence of 79 per cent.

Trout in 1929 stated that recurrences were due to failure to tie off the long saphenous vein and the perforating veins.

McPheeters stated:

> "If the great saphenous trunk is not thrombosed and firm up to the saphenofemoral opening, we must expect to have both a recurrence of the old varicose vein and the formation of many new ones through the opening up of many collaterals."

Thies stated that two essentials were necessary to minimize recurrences:

> "(1) The extent and completeness of the destruction of the intima; and (2) the type of primary thrombus formation. The activity of the circulation determined whether one was to have a stagnant red clot or a white thrombus. More rapid recurrences occur in postoperative thrombophlebitis, bacterial thrombophlebitis after ligations, and injuries where the activity of the circulation has been retarded."

In 1930 de Takats suggested the ambulatory ligation of the saphenous vein to diminish recurrences. This method was indicated where the saphenous vein above the knee was dilated and showed a reflux from above. By so ligating, the pressure from above was removed, a barrier to thrombi was created and incidentally the number of subsequent injections was reduced. Subsequently de Takats reported his results in 200 cases so treated. Simultaneous injections at the time of ligation were not advised because of the frequent occurrence of distal thromboses or because such a procedure might activate a resting infection. Twenty per cent had complete obliteration after ligation. Complications were reported in 2.5 per cent, and these included one death. In sixty private cases he reported a recurrence in only 3 per cent. The indications for this procedure de Takats stated were three:

1. Valvular incompetence of the long saphenous vein in the thigh.
2. Valvular incompetence of the anastomotic branches if they resist injection treatments.
3. Ascending thrombophlebitis of the saphenous vein.

Howard, Jackson and Mahan in reporting on recurrences following injection stated:

> "The results of follow-up examinations with the microscopic studies of the fate of therapeutic thrombosis convinced the authors that treatment by injection unaided by ligation, excision or stripping of main venous channels and perforating veins when incompetent, will not serve to obtain permanent cure in cases of varicose veins except in the few isolated cases of dilated single veins with competent saphenous and perforating valves."

Homans stated:

> "The truth is that it is impossible that any procedure which fails to do what a complete excision does (that is, remove the great saphenous vein from the femoral nearly to the ankle and with many of its branches) can have nearly as good late results. There is a question whether it may not be worth while in some instances to divide the varicosed saphenous vein as high as possible, that is, near the saphenous opening, and make the injection into the distal portion."

In 1930 the author in a report on the use of sodium chloride in the treatment of varicose veins mentioned that in occasional cases the great saphenous vein was ligated at the saphenofemoral juncture and excised to the knee, and the remaining varicosities below the knee were later injected. The frequency of recurrences, the frequent inability to thrombose satisfactorily the dilated and incompetent great saphenous vein, and the all too frequent resulting thrombophlebitis, which in one case terminated fatally by multiple metastatic abscesses secondary to a suppurative thrombophlebitis, led the author since that time to follow a procedure which may be described as the ambulatory division and ligation of the saphenous vein and simultaneous injection of the distal segment.

This procedure is not carried out routinely, but only in those cases where the great saphenous vein is obviously incompetent and can be either seen or palpated as a distended dilated trunk. Where the saphenous vein in the thigh is obviously competent the procedure is confined to simple injections, according to accepted technic, into the varicosities. The sclerosing solutions of choice are quinine and urethane, and sodium morrhuate.

In those cases where ligation, division and injection of the distal segment is determined upon the technic is as follows: The operative procedure is carried out, usually, in an operating room in the clinic. If the dilated incompetent saphenous veins involve both extremities, only one side is done at a time. The patient is placed supine on the operating table, the operative field is prepared, and after infiltration with procaine hydrochloride a transverse incision is made, high and on the inner aspect of the thigh. Dissection is carried down to the vein, which is isolated and then divided between forceps close to its femoral opening. The proximal stump is doubly ligated with Plain No. 1 catgut. A canula or large blunt needle which has been previously connected with a 20 c.c. Luer syringe containing 10 to 15 or 20 c.c. of sodium morrhuate is now inserted into the open lumen of the distal segment. Great care is used so that none of the solution escapes into the wound. The vein is ligated firmly about the needle or canula. The solution is allowed to flow into the distal vein. No great pressure is needed. The vein is then firmly and doubly ligated as the canula or needle is withdrawn and the wound is closed. A dressing is placed over the operative field and strapped firmly in position. Beginning at the ankle the leg is then wrapped snugly to the thigh with an Ace compression bandage.

The whole procedure only takes a few moments and the patient is allowed to get up and return home immediately. He is directed to remain up and to walk about. He is directed to return in two or three days for observation. Usually at this time the vein is firm and will be found to be completely thrombosed. In a few cases a phlebitis or periphlebitis may be present which will further restrict the patient, but this usually subsides promptly with the use of cold compresses. A brownish discoloration of the skin may be present, but this as a rule disappears gradually. After the first postoperative observation the patient may return to his usual duties and not be greatly handicapped. He is seen repeatedly at intervals until the wound is healed and the reaction has subsided. If there are any remaining varicosities, injections may then be given. For subsequent treatments quinine and urethane are preferred.

Conclusions

The frequency of recurrences after injection of varicose veins has led many investigators to suggest a combination of surgical and non-operative treatment, namely, ligation of the incompetent saphenous vein to be followed simultaneously or subsequently by injection into the non-thrombosed segments.

The ambulatory ligation of the saphenous vein has been proposed by de Takats and his results in 200 cases have been reported.

The ambulatory ligation and injection of the saphenous vein is proposed by the author and in his experience has given very gratifying results.

SODIUM RICINOLEATE AS A SCLEROSING AGENT*

H. W. FROEHLICH, M.D., F.A.C.S., and E. C. HENRIKSON, M.D.

Minneapolis

A NEW substance for the sclerosing of varicose veins is herewith presented. We feel that it has advantages over any other solution so far used. The solution is prepared from castor oil, which is composed largely of ricinoleic acid glyceride. The sodium ricinoleate is prepared in accordance with the directions of Rider.[2] The product resulting from this purification process is approximately 97 to 98 per cent pure sodium ricinoleate contaminated only with small amounts of sodium oleate and sodium linoleate. Repeated experimental work has shown that these two salts of unsaturated fatty acids are similar in chemical and physiological properties to sodium ricinoleate and that their presence in the sodium ricinoleate solution is not harmful.

---

*From the Veins and Ulcer Clinic of the Minneapolis General Hospital.

Undoubtedly, one of the greatest contributing factors to the variations in the effectiveness of sodium morrhuate solutions is the fact that these solutions are not made from a single chemical product and that the composition of the materials used varies considerably with manufacturing methods.

Biegeleisen[1] made a critical study of sodium morrhuate and found great variations in its actions, and came to the following conclusions:

1. Sodium morrhuate is an unknown, relatively unstable mixture of sodium salts of the unsaturated fatty acids found in cod liver oil.
2. Its potency diminishes with age, and is not uniform.
3. It is occasionally capable of slough formation.
4. No local anesthetic should be added to the mixture.
5. The advisability of incorporating an antiseptic in the solution is open to question.
6. The irritating effect of sodium morrhuate is due to its soapy characteristics, and has been duplicated experimentally by a solution of commercial liquid soap.
7. Sodium oleate, which is one of the fatty acid salts present in sodium morrhuate, has been tested and found to possess sclerotic power.
8. The continued testing of the other fatty acid salts present in the mixture is necessary if a standardized pure product is to be developed.

In contradistinction to this, sodium ricinoleate can be made in very pure form and its composition controlled within very narrow limits. The advantage of this fact can easily be appreciated. It means that we are always using a substance of definite, stable, chemical composition which will give a uniform clinical result limited only by the patient's individual reactions.

Sodium ricinoleate is put into solution in distilled water and the PH of the resultant solution adjusted to 8.0. The solution is a pale yellow limpid product, the composition of which in successive batches is exactly known.

The clinical activity of sodium ricinoleate solution is undoubtedly very similar to that of sodium morrhuate. According to Gerwe (private communication) "it is a powerful hemolytic agent which on contact with blood cells hemolyzes them, setting free thromboplastic stromata and other hemolytic debris which are potential substances to initiate the formation of thrombi." These thrombi or clots are a brown, jelly-like, soft, coagulated mass which resists resolution or absorption for a long time. It is for this characteristic that we have been wishing. We want these clots to remain in the veins until they become firmly organized and the vein permanently obliterated.

We have used experimental acid, alkaline, and neutral solutions in 5 and 10 per cent strengths. The acid and alkaline solutions have no advantage over the neutral solution. We also believe that the 5 per cent solution is the best for general use. Stronger solutions have no particular advantage and have the disadvantage of producing more pain and more tissue damage when perivascular infiltration occurs.

In trying out a new substance it is well to always use the same method. Our procedure, which gives us uniformly good results, is as follows: When the patient is first seen a history is obtained, drawings of the veins are made on charts, and a urinalysis is done. If there are no contraindications, we then inject 1 c.c. of sodium ricinoleate in a small loop of vein in the lower leg, as a test to see if the patient has any idiosyncrasy to the solution which manifets itself by allergic reactions, faintness, weak pulse, and cold sweats. When using sodium morrhuate, we have had several severe reactions within a few minutes after injection. Several patients developed a generalized eczema covering the entire body. Two of these patients had to be hospitalized. A number of such experiences have been reported in the literature recently by others. With sodium ricinoleate the only reactions in a series of 300 cases have been those in which irregular purplish red blotches varying in size from 2 to 20 mm. appeared in the skin drained by the offending vein. In two patients these patches took the form of a localized urticaria. However, there were no subjective symptoms. A cramping pain in the lower leg and foot is sometimes experienced when 5 c.c. doses are used.

The patient returns for a second injection in two or three days. Three to 5 cubic centimeters are injected at the highest point possible. The needle on an empty 2 c.c. syringe is inserted into the vein carefully while the patient sits on the edge of a table. Then the patient lies down and the leg is elevated to drain as much of the blood from the vein as possible. The small empty syringe is replaced by one containing the solution, without moving the needle. The injection is made carefully, watching for evidences of perivascular injection the while. A tourniquet is applied near the groin. The syringe is removed, leaving the needle in place. The patient is asked to sit up with the leg hanging down. This change in position gives the solution a chance to gravitate downwards. The tourniquet is removed in from three to five minutes. The needle is then withdrawn and a small compress taped over the injection site.

By this method we have often been able to sclerose the veins of an entire leg by two or three injections. The advantage of puncturing the vein only two or three times is apparent, as every time the wall is penetrated there is a possibility of a slough should some of the solution leak out through the needle opening. Naturally, the less stoical patients prefer this method to the multiple puncture method previously used in this clinic.

It is our opinion that ligation of the saphenous vein in the groin greatly decreases the possibility of recurrence in those patients having large varicosities extending into the thigh. Under local infiltration of 2 per cent procaine the vein is exposed through a 5 to 10 cm. incision. A small section is excised and the cut ends doubly ligated, using chromic catgut No. 1. Then 3 to 5 c.c. of the sclerosing solution is injected into the exposed distal stump and the skin closed, using dermal or skin clips. The patient is allowed to go home at once, and may be up and about as desired. Should the leg become quite painful we advise hot applications.

All patients treated should be checked for recurrences at intervals of from two weeks to two months for a year.

Our series consists of 300 patients injected at the Minneapolis General Hospital and in private practice. In over 600 injections there were six small sloughs which probably were due to faulty technic or leakage into the perivascular tissue. Two patients were given injections of 1 c.c. of the 5 per cent sodium ricinoleate with no effect on the varicosity. This was undoubtedly due to the fact that the veins were of such large caliber that the solution was diluted too much by the blood in the lumen. Later, however, when 3 to 5 c.c. of the same solution were injected into the well emptied vein very good results were obtained.

Summary

1. Sodium ricinoleate in a 5 per cent aqueous solution is stable and well suited for sclerosing.
2. This solution does not produce a systemic reaction when used as recommended.
3. The results are uniformly good.
4. A large dose may occasionally produce a cramp in the leg and foot.
5. A perivascular injection may produce a slough.
6. Recurrences appear less frequently because the clot is firmer and not so easily absorbed.

References

1. Biegeleisen, H.: Evalution of sodium morrhuate therapy in varicose veins; critical study. Surg., Gyn. and Obst., 57:696-700, (Nov.) 1933.
2. Rider, T. H.: The purification of sodium ricinoleate. Jour. Am. Chem. Soc., 53:4130-33, 1931.

SUPRACONDYLAR FRACTURES OF THE ELBOW AND THEIR COMPLICATIONS*

MYRON O. HENRY, M.D.
Minneapolis

IN a series of 100 consecutive elbow fractures of all types seen by the author[3] in private practice, 40 per cent occurred in children under eleven years of age, and 30 per cent of the entire series were supra- or diacondylar in type. These figures support the impression that the supracondylar fracture of the elbow is one of the most common. Everyone in general practice is familiar with this fracture, yet it sometimes is overlooked, is frequently badly treated, and is responsible for many malpractice suits today.

The clinical picture of a supracondylar fracture is well known. A child with a swollen, painful elbow, in which the three bony landmarks retain their normal relationship to each other, should arouse suspicion of a supracondylar fracture. Palpation may reveal a tender point just above the condyles, or the sharp edge of the proximal fragment may be felt anteriorly. Manipulation may reveal crepitus or false motion. Great swelling, which obliterates the landmarks, should also arouse suspicions. The x-ray study, which is imperative in such a picture, reveals the fracture.

It is important to recognize, in studying the x-ray, that there is usually a rotatory displacement of the distal fragment about the vertical axis of the shaft. The upper fragment seems to be rotated inward because the lower fragment is displaced and rotated outward. It is well to recall that the lower epiphysis of the humerus points forward along an axis of approximately 135 degrees with the shaft. This fact is frequently overlooked in treating these fractures and is responsible for many poor results.[2]

Supracondylar fractures are usually treated in the flexed position, but they are *not reduced* by the flexed position. The time-honored principles of fracture reduction should be applied in these cases—traction, counter-traction, and manipulation. The arm is put up in the flexed position because the triceps tendon steadies the fragments when the fracture is properly reduced.[6] Acute flexion is not necessary and, if applied blindly, may lead to disaster. The degree of flexion employed should be inversely proportional to the swelling.

The adhesive dressing of Sir Robert Jones is most commonly employed in these cases, but it must be properly applied[5] to avoid trouble. The broad strap of adhesive should lie flat on the medial side of the arm and forearm, and should be applied evenly to the lateral side, letting the ends cross where they may. The adhesive dressing does not prevent rotation deformities in severe fractures, nor can it be employed when there is great swelling. In such cases the molded posterior splint of plaster of Paris is very satisfactory, and is more likely to remain efficient as the swelling subsides. In addition to the simple adhesive, or posterior plaster splint, I usually place the extremity on a simple platform abduction splint at shoulder level. This position furnishes the elevation indicated by great swelling and meets the tendency to lateral and rotation displacements nicely. Anterior splints and dressings which completely encircle the extremity, should never be used because they may interfere with the circulation.

The patient should be seen by the physician four hours after the dressings are applied; and, during the first twenty-four hours of treatment, he should be seen at least every four hours by a competent person if not by the physician himself. The circulation of the fingers, as well as the sensation in them, must be known with certainty, especially during the first twenty-four hours.

The healing period varies from six to twelve weeks in these fractures, but the position of acute flexion should not be maintained over three weeks. Callus is usually firm enough to permit gradual extension after three weeks. Passive motions, in my experience, have only prolonged the healing period and contributed to complicating myositis ossificans. A simple sling can be employed after three weeks—gradually permitting more extension during the day but returning to position of acute flexion at night. If the position of acute flexion is maintained without interruption much longer than three weeks, there may be limitation of extension that is difficult to overcome. This is due to firm fibrosis of the cubital clot. After bony union is firm such a scar may respond to gradual stretching with a weight *tied* to the wrist.

---

*Read before the Eleventh District Medical Meeting of Wisconsin at Superior, Wisconsin, August 15, 1934.

Complications

The poor results in supracondylar fractures are usually due to failure to secure good reduction, to failure to maintain reduction, or to prolonged immobilization. This type of fracture, however, is notorious for three complications which frequently occur. They are myositis ossificans, Volkmann's paralysis, and malpractice suits.

Myositis ossificans, or ossifying hematoma, is prone to occur in injuries about the elbow.[1] Perhaps it results from extensive stripping up of periosteum or from extensive injury to soft parts. The exact reason for its formation is unknown, but certainly it is prone to occur after frequently repeated or clumsy manipulations. Its development is often accelerated by clumsy manipulations and too early attempts at passive motion. The process is usually self-limited in elbow fractures. Operation to remove the mechanical block by myositis ossificans should be delayed until growth of the mass has stopped; otherwise it may not check the process at all.

Volkmann's paralysis is the *bete noir* of these fractures. It is a muscular ischemia, not a nerve injury, and results from interference with the venous return. The causes of this interference are usually incomplete reduction of the fracture, application of an anterior splint to the unreduced fracture, a tight circular dressing, or the position of acute flexion. It is important to remember that Volkmann's paralysis does occur from hemorrhage in the deep tissues, which may be severe enough to stretch the fascia and skin so as to cut off the return venous flow. The early symptoms are important. They are swelling, numbness, tingling, pain and cyanosis—in that order. Paralysis does not obtain for a few hours after the onset of these symptoms. If external factors are producing the interference, they must be relieved —circular dressings cut, volar splints removed, and the position of acute flexion changed immediately. The extremity should be elevated and external heat applied. When the trouble is due to internal hemorrhage, the hematoma can be aspirated or drained by incision at the site of greatest swelling. Should it be necessary, multiple incisions can be made through the fascia to relieve the pressure. Rarely it is necessary to reduce the fracture by leverage through a posterior incision splitting the triceps.

The *medico-legal* complications of supracondylar fractures nearly all arise from claims of negligence. The responsibility of the physician begins when he starts to treat the case.[4] A physician is honor bound to render first aid, but he need not accept a case for treatment unless he wishes. The acceptance of the case for treatment "implies that the physician possesses reasonable learning and skill such as is ordinarily possessed by the physicians of the locality where he practices." He must exercise reasonable care and his best judgment. He is considered negligent if his dressings interfere with the circulation.

It is important therefore to make a careful examination and then advise the patient, or his family, of the exact condition.

If disturbances in circulation and sensation are present at the outset, it is wise to make such facts known before witnesses and write them in the record.

Secure an x-ray before you begin and *after* your manipulation.

It is unwise to begin unless you are qualified to treat the condition by accepted methods and have the necessary equipment.

A consultant should be called if the condition is grave or is not progressing satisfactorily and *pleasantly.*

Lastly, the physician should be careful of his prognosis in these cases and particularly careful of his remarks about other physicians.

References

1. Cotton, F. J.: Dislocations and Joint Fractures. W. B. Saunders Co., 1924.
2. Eikenbary, C. F.: Fractures of the elbow. Jour. Bone and Joint Surg., 10:757-62, (Oct.) 1928.
3. Geist, E. S., and Henry M. O.: Dislocations and simple fractures of the elbow. Minn. Med., 11:509-13, (Aug.) 1928.
4. Key and Conwell: Fractures, Dislocations and Sprains. C. V. Mosby, 1934.
5. Scudder, Charles: The Treatment of Fractures. W. B. Saunders Co., 1923.
6. Wilson and Cochrane: Fractures and Dislocations. Lippincott, 1925.

ANGIOID STREAKS OF THE RETINA ASSOCIATED WITH PSEUDOXANTHOMA ELASTICUM*

ANDERSON HILDING, M.D., Ph.D.

Duluth

THE first report of angioid streaks of the retina was made by R. W. Downe in 1889. From then until 1932 there have been some ninety cases reported in the literature, but it was not until 1929 that the relation between the skin disease called pseudoxanthoma elasticum and angioid streaks was first suggested by Ester Grönblad. Since that time the simultaneous occurrence of both in certain patients has been reported and a causative relationship suggested by a number of observers. Ester Grönblad has summarized and correlated all that was known about angioid streaks up to the year 1932 in an extensive treatise published as a supplement to the Acta Ophthalmologica.

Through her studies she arrived at the following conclusions: Angioid streaks are not vessels, nor are they caused by hemorrhages or folds in the retina. The streaks are ruptures in the lamina vitrea and inner layers of the choroid due to a degenerative process that attacks elastic tissue. It is the same degenerative process that attacks the elastic tissue of the skin to produce pseudoxanthoma elasticum. The hemorrhages which appear in the fundus are secondary. Angioid streaks are, therefore, a localized manifestation of a systemic disease. This disease is an atrophic or dystrophic process of elastic tissue. It seems to be hereditary.

The fundus picture varies tremendously, but, in general, presents certain characteristics. A well developed case usually shows an area of choroiditis about the discs from which radiate the streaks that give the disease its name. These streaks may be broad or narrow, branched or unbranched, distinct or faint. They vary in color from gray, through brown to red. They often extend to the equator, where they ramify and end. Hemorrhages are common, especially about the macula. Irregular exudates and areas of pigmentation are also frequent. When the streaks cross the course of a vessel it is seen that the vessel lies superficial to the streak.

The case which I am presenting tonight exhibits both well developed fundus and well developed skin lesions. The latter were not recognized when first seen, largely because of my own ignorance and partly because of an interesting incident in the past history.

S. P., a thirty-five year old Polish woman from the country, came to me first on August 31, 1933, with this story: On August 8, while picking potato bugs in her garden, she had been seized with a violent headache. Thinking that it was caused by the heat of the sun, she quit her work and went into the house, but the headache did not cease. It kept her awake all night and continued with undiminished violence for twenty-four hours. Upon arising in the morning, she noticed that her vision was diminished, "as though there was a cloth before her eyes." Since that time her headache had gradually improved but was still severe at times. Her vision had not improved at all.

Her past history contained a few points of interest, one of which misled us. In the World War she served as a nurse on the Polish front for one year, during which time she was wounded twice and suffered powder burns about the arms, back, and shoulders. She came to this country nine years ago and married six years ago. There have been no pregnancies. Her husband had been married previously and had had one child with his first wife, that died when but three weeks old. As far as she was able to say, no one among her relatives had had either visual disturbance or skin disease. The rest of her past history and the family history was unimportant as far as her present illness was concerned.

Examination.—Upon examination it was found that her vision was 20/100 O.U. The external examination of both eyes gave entirely negative findings. Both fundi exhibited well developed pictures of angioid streaks, the left more advanced than the right. Both showed a degenerative choroiditis about the disc, from which radiated irregularly sized and shaped brownish streaks. The retinal vessels coursed over the streaks and appeared to be entirely normal. There were hemorrhages about both discs and both maculae, some of which were obviously interfering with vision. Just above the left macula there was found a circumscribed bluish white exudate about half the diameter of the disc that suggested a tubercle.

A diagnosis of angioid streaks, probably complicated by some intracranial pathologic changes, was made and the patient referred for a general examination.

---

*Read before the Minnesota Academy of Ophthalmology and Otolaryngology, October 13, 1934.

The Wassermann test and extensive blood and spinal fluid studies gave entirely negative findings. The only positive findings were three dead teeth and some peculiar skin changes on the arms, shoulders, and neck which the patient stated were powder burns. No cause for the violent headache was found.

Subsequent Course.—Headaches, nausea, vomiting with great pallor and loss in weight continued until December, 1933, when the patient was admitted to the University hospital, where she remained for one month. During this month she improved remarkably in every way. Even her persistent headaches became very much less.

After a few months at home she had another series of headaches in the spring of 1934. Her vision at that time with correction was O.D. 20/30 and O.S. 20/100. She improved again early in the summer and seemed well all summer. She was seen again in October, 1934, when she stated that her headaches returned in a mild form periodically and that her vision was improved. She was refracted and her best vision found to be O.D. 20/30, O.S. 20/50. The fundi appeared to be much as before, excepting that there were not so many hemorrhages present.

Discussion.—I happened to discuss this patient with Professor Rönne of Copenhagen last spring. It was he who suggested that a new search be made for skin lesions. Upon my return I again examined the powder burns on the patient's arms, shoulders, and neck. When examined closely, it was clearly seen that there was a symmetrical band of pathologic skin about the neck and a patch in each axilla that were distinctly different from the brown powder marks upon the arms, shoulders, and back of the neck. In a word, the former were typical lesions of pseudoxanthoma elasticum and corresponded exactly with the text-book picture.

This case serves to illustrates again the simultaneous occurrence of pseudoxanthoma elasticum and angioid streaks and to suggest a common etiology for the two. Unfortunately, there have never been any microscopic studies of angioid streaks and the two probably should not be accepted as manifestations of the same disease until it is demonstrated that the pathological pictures correspond.

The cause of the intense headache suffered by this patient is not clear. It may be that this disease occasionally produces intracranial lesions of a painful nature. On the other hand, the headache and vomiting may have been on another basis entirely. The patient's home conditions were obviously unhappy and the nervous reaction undoubtedly intensified her symptoms.

References

Doyne, R. W.: Choroidal and retinal changes, the result of blows on the eyes. Tr. Ophth. Soc. U. Kingdom, 9:28, 1889.

Grönblad, Ester: "Angioid streaks"—Pseudoxanthoma Elasticum Vorleusige Mitteilung. Acta Oph. 7:329, Tasc. 3, 1929.

Grönblad, Ester: "Angioid streaks"—Pseudoxanthoma Elasticum. Acta Oph. Supplement 1, 10:1932.

EDITORIAL

MINNESOTA MEDICINE

OFFICIAL JOURNAL OF THE MINNESOTA STATE MEDICAL ASSOCIATION

Published by the Association under the direction of its Editing and Publishing Committee

EDITING AND PUBLISHING COMMITTEE

J. T. CHRISTISON, Saint Paul   C. B. WRIGHT, Minneapolis
E. M. HAMMES, Saint Paul   T. A. PEPPARD, Minneapolis
WALTMAN WALTERS, Rochester

EDITORIAL STAFF

CARL B. DRAKE, Saint Paul, Editor
W. F. BRAASCH, Rochester, Assistant Editor
C. A. MCKINLAY, Minneapolis, Assistant Editor

Annual Subscription—$3.00.   Single Copies—$0.40
Foreign Subscriptions—$3.50.

The right is reserved to reject material submitted for editorial or advertising columns. The Editing and Publishing Committee does not hold itself responsible for views expressed either in editorials or other articles when signed by the author.

Classified advertising—five cents a word; minimum charge, $1.00. Remittance should accompany order.

Display advertising rates on request.

Address all communications to Minnesota Medicine, 2642 University Avenue, Saint Paul, or 324 Fourth Avenue South, Minneapolis. Telephones: Nestor 1381 and Dupont 1013.

BUSINESS MANAGER

J. R. BRUCE, Saint Paul

Volume 18   SEPTEMBER, 1935   Number 9

Tularemia

The increase in reported cases of tularemia in recent years and the death last month of Dr. C. N. McCloud of Saint Paul from that cause have added increased concern and renewed interest in this comparatively rare disease.

Dr. R. K. Green of the Department of Bacteriology and Immunology of the University of Minnesota has been making a special study of the prevalence of the disease in the state. Besides being found in ground squirrels, rabbits and field mice, tularemia has been found in the sharp-tailed and rough grouse, the quail and sage hen. Experimentally the cat can be infected through the digestive tract while the ringneck pheasant seems particularly resistant to the infection.

While the infection can be spread by the ingestion of raw diseased flesh, the tick is mainly responsible for the spread of the disease. Rabbits are very generally heavily infested with ticks and it is the rabbit tick which infects the game birds. While the main danger of human infection lies in the handling of infected rabbits or birds, one may become infected from the bite of an infected tick, as occurred in the case of Dr. McCloud. The rabbit tick does not bite human beings, but it has lately been appreciated that the common wood tick may infect man.

There is evidence that tularemia may have been responsible for the decimation of the rabbit and grouse population in Minnesota in 1925 and 1926. If so, the disease is more widespread in animal and bird life than is commonly appreciated. The significance of this fact is the need for hunters to use precautions in the cleaning of wild game. While there is a comparatively slight chance of infection from the bite of the woodtick, that danger also exists. Of course, there is more chance of becoming infected with Rocky Mountain spotted fever through the bite of the tick. This disease is much more serious and is showing an increased incidence and dissemination in recent years.

It is interesting in connection with tularemia to note that Moses forbade not only the eating but the touching of the hare (Lev. xl: 6, 8). Presumably Egyptian medicine of that period, which was of high order and in which Moses was undoubtedly well versed, was cognizant of some disease in rabbits.

Further study of the disease in animals and birds with a view to the conservation of animal and bird life, as well as to the prevention of human infection, is strongly indicated.

Dinitrophenol

The recent final report by Tainter[1] and coworkers of their experience with the therapeutic use of dinitrophenol in a series of cases of obesity emphasized that its administration was the method of last choice. The disadvantages of administration have been the production of undesirable side reactions which were unpredictable and occasionally alarming. The authors note that cataract developed in one of the patients in the series six months after discontinuance of the drug.

The use of the drug would be limited in the treatment of obesity by its proponents to those individuals in whom all other methods of control fail; in other words, to the group in whom sometimes relatively minor decreases in diet were not obtained in the attempt to balance energy intake and outgo. But the caloric deficit to be obtained by safe doses of dinitrophenol is not greater than that gained by removing from the diet two pats of butter at each meal, as stated by Evans.[2] If a patient is unwilling or unable to coöperate to that extent. he would seem a poor subject for the use of a drug with admittedly definite risks. It would seem that continued obesity in such individuals might be much less hazardous than the treatment. Accordingly, dinitrophenol would not seem to merit a place in safe and non-meddlesome therapy.

---

[1] Tainter, M. L., Stockton, A. B., and Cutting, W. C.: Dinitrophenol in the treatment of obesity. Jour. Am. Med. Assn., 105:332, (Aug. 3) 1935.

The drug undoubtedly has great value in animal experimentation as it is a powerful stimulant of tissue metabolism, probably by direct action on the cells. It does not produce pulse acceleration and stimulation of the central nervous system similar to that noted after large doses of thyroid extract. Clinically, when a metabolic stimulant is indicated and thyroid substance is used, such reactions are a part of its virtue. They act as danger signals, which, along with determination of the basal metabolism, make such controlled thyroid therapy relatively safe and free from the subtle and insidious risks of dinitrophenol administration.

C. A. McK.

Football Injuries

From time to time the question is raised as to whether the hazards of football are not too great. Discussion quiets down and football continues to be played—in fact, it has been enjoying an increasing popularity both with the public and American youth in recent years. The training in manly courage, teamwork and good sportsmanship is an asset very much worth while. Everything should be done, however, to minimize the likelihood of serious and unnecessary injuries to the players.

The modification of football rules has doubtless descreased the chances of serious football injuries. Possibly further modification of the rules would help.

Landry* has made an interesting survey of football injuries from the literature and his personal experience at Tulane University. He refers to some of Eastwood's conclusions. This writer stated that head injuries, which are the most serious types, are always due to blocking, being blocked, or line defense. He further found that most injuries occurred in blocking, next in tackling, and next in being blocked. This part of the play seems to be most hazardous. Headgears are therefore obviously desirable for the protection of the player, although too hard a headgear becomes a hazard for the opponent.

The flying tackle was a most dangerous maneuver for the tackler and was therefore ruled out. We used to hear a lot about "tackling low." It is the low tackle that is dangerous. It is very liable to lead to severe injury from violent impact with a knee or foot. Tackling the mid-thigh region is much safer.

In the speeding up of the game light equipment has become desirable. The elimination of the former protection of thighs and legs results in more hematomas and muscle injuries than formerly. The author wisely remarks that "Charlie horse," which is a tearing of muscle fiber, requires heat and rest and *not massage.* More disabling, however, are the joint injuries. The knees head the list. A runner tackled from the side is likely to sustain a tearing of a lateral ligament, especially if tackled when his weight is all on one leg. The shoulder joint is not infrequently injured. A fall on the elbow or extended arm or a missed tackle, the shoulder hitting the ground violently, may result in a tear of the acromioclavicular ligament with prolonged disability. Ankle injury is less likely to result from being tackled than from running, especially on rough ground.

The fatalities due to football in 1933 amounted to thirty-seven, only twenty-eight of which, according to Eastwood, were directly attributable to the game. Of these, two occurred in college football, twelve in high school, twelve in sand lot play, et cetera. This much higher figure for high school play is not surprising, considering that the players are not only less experienced, but far more numerous.

Dublin's analysis of the mortality rate in college athletes graduating prior to 1905 which appeared in *Harper's Magazine* in 1928 is referred to. Dublin found the rate for baseball players highest, crew members next, track next, and football players lowest—even lower than that for non-athletes. Phi Beta Kappa members lived longer than athletes.

---

[2] Evans, F. A.: In discussion of paper by Tainter, Stockton and Cutting.

*Landry, Lucian H.: Injuries peculiar to modern football. Am. Jour. Surg., 28:601. (June) 1935.

The author concludes that the care of football injuries offers a special field for young surgeons. Coaches would do well to employ medical assistance more than they do, not only for treating injured football players, but for frequent examination. A slightly injured or fatigued player is more liable to serious injury than a sound and fresh player.

Snake Bite

Bites from poisonous snakes are of rare occurrence in Minnesota. And yet rattlers have been seen along the Mississippi River not far from the Twin Cities and elsewhere, and the bite from a rattler is a serious emergency.

Compared with the seriousness of snake bite in Brazil, for instance, where some 5,000 individuals are said to die yearly from the bites of poisonous snakes, and 20,000 in India, where ignorance and superstition aggravate the mortality from this cause, the situation in the United States does not seem very serious. Yet, Githens* has just reported the collection of the records of some 2,376 bites in this country from 1927 to 1934. According to his study the Texas diamondback rattlesnake exists to some extent in all sections of the United States. This is said to be due in some measure to the escape of this particular species from travelling showmen as occurred in Wisconsin. In the eastern half of the country the copperhead is more or less often encountered. These two snakes are the most dangerous as they are aggressive and strike without warning. The water moccasin and Florida diamondback rattler are found in a narrower range and are more limited to the wild districts of Florida particularly.

More than half the bites recorded by this observer involved the lower extremity, and most of the remainder the upper extremity. Less than 1 per cent were of the body and head. An appreciable number of children, snake catchers, showmen and scientists helped make up the list of those bitten.

Of the poisonous snakes, as a rule the larger the snake the more dangerous, since it possesses more venom. The exception seems to be an old snake that though large possesses less venom.

The Florida diamondback rattlesnake is the largest rattler in this country, and the Texas variety next. The other rattlers and the water moccasin are not so large and their bites are therefore less likely to cause death. Other factors modify the seriousness of snake bite. Crimmins mentions the practical point that a perceptible lump in the snake indicates that the snake has eaten within three days and its bite is therefore less likely to be fatal, as two-thirds of a snake's venom is discharged with a bite and two weeks are required for accumulation of the venom.

The old-time remedies for snake bite, whiskey and potassium permanganate, have gone into the discard. Modern treatment consists of prompt application of a tourniquet above the knee or elbow, multiple incision through the skin at the site of the bite and suction either by cupping or sucking. The value of antivenom serum has been firmly established. The serum manufactured by the Butantom Institute in Brazil, it is estimated, has reduced the mortality from 25 to 2.5 per cent in South America. Mulford makes a refined polyvalent serum† for use in North America for treating rattlesnake, copperhead and moccasin snake bites. Hutchinson reports a reduction of mortality from 10.8 to 3 per cent by the use of polyvalent serum given in most cases subcutaneously. The serum, however, is most efficacious if given intravenously, and intramuscular injection is better than the subcutaneous. The usual precautions must be taken in its administration as with other horse serums.

It is said that the picture presented by a person a few hours following a bite from a rattler is never to be forgotten. The swollen, brawny extremity, the presence of blebs near the fang marks, the pain and evidence of shock are striking. As the toxin is hemolytic and neurotoxic, the blood picture requires careful watching. Lowered blood pressure demands intravenous saline or glucose, and anemia indicates the need of blood transfusion. It is claimed by some that the aversion which amounts in most individuals to terror at the sight of a snake is an entirely acquired characteristic and that the average child is not instinctively afraid of a snake. If so, children should continue to be educated. It is true that reptiles hold a certain fascination for many human beings. In this group Elsie Vener, the snake charmers, attendants in snake houses, certain scientists, and the individual in almost any small group of people who delights in handling at least the non-poisonous snake, may be placed.

---

*Githens, Thomas S.: Snake bite in the United States. Scientific Monthly, 41:163, (Aug.) 1935.

†Mulford's Antivenom or North American Anti-Snake-Bite Serum is available day or night at the office of Sharp and Dohme, Inc., 256 First Avenue North, Minneapolis.

OF GENERAL INTEREST

Dr. A. E. Sohmer of Mankato has just returned from a tour of Northern Minnesota.

* * *

Announcement has been received of the engagement of Dr. H. Bradley Troost of the Mankato Clinic to Miss Betty Todd of Saint Paul. The wedding will take place early this winter.

* * *

Dr. L. J. Monson of Hendricks, Minnesota, was married July 27, 1935, to Miss Eunice Johnson of Saint Paul. Dr. Monson is the son of Mrs. Martin Monson of Canby, Minnesota.

* * *

The Federal Relief was discontinued in Blue Earth County the first of August. The County Society has been doing the county work. The County Board will unquestionably appoint a county physician to do the work in the future.

* * *

Dr. J. T. Schlesselman and Dr. A. V. Denman of Mankato are leaving this month for Canada to hunt big game. Dr. Albert Fritsche of New Ulm and Mr. Harry Pribnow of the National Citizens Bank, Mankato, are going with them. On these trips moving pictures figure very largely.

* * *

Dr. Henri Coutard, chief of the department of roentgentherapy of cancer at the Curie Institute, University of Paris, France, will deliver the twelfth Lewis Linn McArthur lecture of the Frank Billings Foundation of the Institute of Medicine of Chicago in the theater of the Chicago Woman's Club, 72 East Eleventh Street, at eight o'clock on Tuesday evening, October 1. The subject of his illustrated lecture will be "The Conception of Periodicity as a Possible Directing Factor in the Roentgentherapy of Cancer."

* * *

The fourteenth edition of the American Medical Association Directory is in preparation. Its value depends largely on its accuracy and members of the American Medical Association particularly are urged to submit their data promptly when requested. It is often of distinct advantage to members not to allow their membership in county societies to lapse and to young practitioners not to delay joining their local county societies, as such membership shown in the American Medical Association Directory might well be instrumental in receiving appointments with industrial firms, insurance companies, railroads and the like.

* * *

Typhoid in Minnesota.—The incidence of typhoid fever which reached mild epidemic proportions in and about Minneapolis this summer has apparently come to an end. Since the first week in July the number of cases showing first symptoms has rapidly fallen off and it can be safely said that the epidemic is over. Only four new cases with first symptoms beginning in August had been reported in Minneapolis up to the 20th of the month. Two of these were contact cases. Only one new case with onset of symptoms in August had been reported in Saint Paul up to the 20th.

The dissemination of cases throughout the state was noteworthy. Since the first of May, when the epidemic began, to August 20, 171 cases were reported in Minneapolis; twenty-six in Saint Paul; twenty-one in Duluth, and forty-five scattered throughout the state, a good number of these in the environs of Minneapolis. About six deaths have been reported thus far. The water supply of Minneapolis is still blamed as the source of the fever.

STAPHYLOCOCCUS TOXOID

Both favorable and unfavorable results of the use of staphylococcus toxoid in treating chronic staphylococcic infections have been experienced. On the basis of the available evidence one brand of this product was recently accepted by the Council on Pharmacy and Chemistry. The administration of staphylococcus toxoid to patients with chronic staphylococcic infections usually produces a rise in the titer of circulating antitoxin. This rise fails to occur by treatment with vaccines—the only other specific method. According to recent reports (D. S. Murray: Staphylococcus Toxoid, Lancet, 1:303, Feb. 9, 1935; C. E. Dolman, Staphylococcus Toxoid, ibid, 1:306, Feb. 9, 1935) the rise is associated with a measurable improvement in the chronic localized staphylococcic infection. Failures have been reported but these occurred chiefly in cases of acne; in addition, the questions of the specificity of the strains of staphylococcus employed in making the toxoid, and the potency of the preparations used, must be considered. To date, the best results have been recorded with recurrent boils and the least successful with acne.—(J. A. M. A., April 20, 1935, p. 1421.)

In Memoriam

Charles Naumann McCloud

1873-1935

Dr. McCloud, eldest son of David Hance and Marie (Naumann) McCloud, was born February 9, 1872, in St. Paul, Minnesota. His mother was born in Germany and his father at Philadelphia. His death occurred at the Miller Hospital, St. Paul, August 13, 1935, from tularemia, the result of infection by a wood-tick received while on a week-end fishing trip at Danbury, Wisconsin.

Dr. McCloud's early education was received at the old Webster school; following this he attended Macalester College, from which he was graduated in 1890. He then entered the employ of W. A. Frost & Company, druggists, where he remained for two years. In order to fit himself more adequately for what he then deemed his future profession, he matriculated in the School of Pharmacy at the University of Minnesota, receiving therefrom the degree of Doctor of Pharmacy in 1895. He then returned to his former occupation. His ambition, long cherished, toward the medical profession culminated in his entrance into the School of Medicine, University of Minnesota, from which he received the degree of M.D. in 1901. His internship was served at the City and County Hospital, St. Paul, 1901-1902. The conscientious and faithful service he gave while a resident brought to him appointment as Assistant City and County Physician during 1902-1903, after which he entered general practice, later to become the beloved physician of a large and devoted clientele. In 1903 Dr. McCloud was elected Medical Referee of the Minnesota Mutual Life Insurance Company. In 1908 he was advanced to Medical Director. In 1929 he was elected second vice-president and in 1934 he was made vice-president of the company. He retired from active practice in 1933 to devote his full time to his new duties.

Dr. McCloud was a member of the Ramsey County Medical Society and was its president in 1920; the Minnesota State Medical Association, the American Medical Association, and the Minnesota Academy of Medicine, of which he was president in 1929. He was also a member of the Association of Life Insurance Medical Directors and of the American Life Conventions, and has served as chairman of its medical section. He was a staff member of the Miller and St. Luke's Hospitals in St. Paul, a member of the Masonic order, the St. Paul Athletic Club, Nu Sigma Nu and Theta Delta Chi.

Dr. McCloud married Agatha deLambert of St. Paul October 18, 1904. They had two sons. The elder, David M., is a graduate of Harvard University, holding the degrees of B.A. and LL.B. He is now engaged in the practice of law at Dallas, Texas. The younger, Charles Naumann, Jr., was graduated from Princeton with the degree of B.A. in 1934, and will enter the Medical School of the University of Minnesota this year.

Gentle, unassuming, sympathetic, "Naum" McCloud, a devoted lover of the right, a scholar whom wisdom did not make arrogant, courteous, and generous to a fault, his genial companionship, his loyal devotion to family and friends, endeared him to everyone with whom he came in contact. His life is an inspiration and his memory a benediction.

Edwin H. Smith

Dr. Edwin H. Smith, health officer of Bemidji, died July 7, 1935, from pneumonia at the age of fifty-nine.

Dr. Smith had practiced in Bemidji for thirty-four years. He was a member of the Northern Minnesota Medical Association and the Upper Mississippi Medical Society, as well as the Minnesota State Medical Association. He served for fourteen years on the Board of Education in Bemidji, several terms as president of the Board and for several years was chairman of the Christmas Seal sale in Beltrami County. He was also a Mason and a Knight Templar.

Dr. Smith is survived by his widow and two sons, Gordon Smith of Bemidji and John Smith of Grand Forks, N. D., and two brothers, Dr. Clayton M. Smith of Elk River and E. B. Smith of Minneapolis.

MEDICAL ECONOMICS

Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association

B. J. Branton, M. D.
J. A. Moga, M. D.
W. F. Braasch, M. D., Chairman
J. C. Michael, M. D.
A. N. Collins, M. D.

The High Schools Debate State Medicine

When a public question makes its appearance along with disarmament, government ownership of utilities and other such old standbys on the high school debating platform, it is presumably no novelty in the popular consciousness.

It was therefore with some astonishment that physicians learned last winter that sickness insurance and state medicine, pro and con, were to join the perennial debaters' themes. Certainly sickness insurance and state medicine do not constitute a vital question in the lay mind over most of the United States.

The question was chosen by representatives of thirty or forty coöperating members of the National University Extension Association. It is said to have been before the committee for several years.

In any case, requests are already pouring into each state medical office and to the officers of the Bureau of Medical Economics of the American Medical Association for material on the subject.

Affirmative Has Specious Appeal

The question as stated by the Association is as follows:

"Resolved: That the several states should promote a system of complete medical care to be available to all the people at public expense."

Unfortunately, the affirmative in this case is quite likely to make an appeal to young debaters who are full of humanitarian ideals and without any practical experience in life whatever. Also popular magazines and the voluminous material published by the Committee on Costs of Medical Care will provide a wealth of material, most of which is specious but plausible.

It is obviously the duty of the representatives of organized medicine which has taken its stand as unalterably opposed to the provision of "medical care for all the people at public expense," to provide the best possible material for the assistance of those who will defend the negative in this proposition.

It is to be hoped that more good than harm will come out of these debates, if both sides of the question are given a fair and exhaustive investigation by the debaters.

Material Available

A "Handbook of Sickness Insurance, State Medicine and the Cost of Medical Care," which has been prepared by Dr. Leland and his Bureau of the American Medical Association, contains a wealth of information in the form of digests, negative and affirmative, from a variety of authorities and from students in this country and in the European countries where sickness insurance is already in operation.

This handbook and a varied selection of other material, including some that is of special interest to Minnesota, and a bibliography are available for the use of debaters at the office of the Minnesota State Medical Association, 11 West Summit Avenue, Saint Paul.

This material will be kept up-to-date and it should be the business of every member of the association to find out if any of his local high school teams are to debate on this subject and to tell them about this material.

Local Aid

Many of these young debaters will turn to their family doctors or the secretaries of their local county medical societies for assistance.

It is of the utmost importance to the future of medical practice in the United States that this assistance should be given promptly and in good measure.

Furthermore, medical men should make it a point to hear these debates whenever it is possible. They will afford an excellent opportunity to gage the trend of thought on this subject among students and their teachers.

Nor should the Women's Auxiliary be overlooked as a source of aid to the debaters. In every community where there is an organized auxiliary the women might well make it a part of their business this year to consult with the schools, offer their assistance and keep in touch with the debates.

Sickness Insurance is Huge Octopus---C. W. Mayo

Much of the medical testimony on the virtues and vices of European systems of sickness insurance date back a year or two—some of them even more.

The impressions of Dr. C. W. Mayo of Rochester, recently printed in the Staff Proceedings of the Mayo Clinic, on the other hand, are especially interesting and important because they reflect conditions as they are today in England, Germany, Austria and Hungary.

Excerpts are printed below for their timely interest to every physician who is concerned about the mounting propaganda for sickness insurance in the United States. It is hoped that copies may be made available for the use of the high school debaters on the subject.

Says Dr. Mayo:

"Individual impressions are not to be misconstrued as facts. What one person sees in one light, another person sees in a totally different light. On my visit to Europe I attempted to be unbiased, to learn not to go about with a smug feeling of statisfaction that America leads the world.

"It is not without a feeling of awe that a doctor visits such great countries as Italy, Hungary, Austria, Germany and England, for from all of them at various times have come epochal advances in both medicine and surgery, vitally important to the present high standard of the art and science of the practice.

Private Patient is Rare

"As to the present state of the field of medicine in these countries, it was my feeling that it was rather seriously affected by the political and financial unrest, may I call it, which I found evident, although in varying degrees, in practically all of the places I visited. The causes of this unrest need not be accounted for here, but the results of this unrest, as it has affected the care of the sick, the field of research, and the mental and financial status of the average doctor, were of intense interest to me.

"You are all to some extent familiar with the continually growing sickness insurance plan which is compulsory in most continental countries. Where it exists, it has become like a huge octopus, involving in its tentacles all professions, businesses, laboring trades, and government departments, each of which seems to have its own headquarters for insurance. For instance, in most places the Waiters' Insurance Company was very strong, and a waiter needing medical attention was well taken care of. He is required to contribute a percentage of his salary to secure this benefit.

"Many doctors are employed by the various insurance companies, and at ridiculously low salaries, but most of them will accept a low but sure salary because the private patient is comparatively rare, except to the older and well-known doctor. The private patient in most cases is one who has been advised by his insurance doctor to follow a certain line of treatment and goes to a private doctor for confirmation and perhaps for treatment.

Real Talent Buried

"In Budapest I visited one of the buildings which houses a large insurance company. It was crowded; thousands passed through it each day. There they paid in their weekly money, reported for relief money, were treated for minor conditions, or, if sick, came for diagnosis and advice. Time, perhaps, will smooth out many of the rough spots in health insurance as practiced abroad. It appears to offer much and to be sound theoretically, with socialistic tendencies. Actually, it is not as practical as it seems, either to the beneficiary or to the doctor on whom the burden rests; real talent has been buried in positions requiring none. Physicians trained in medical or surgical specialties too frequently hold down posts which keep them so busy with trivial duties and red tape that they do not have the time or the courage, even if the facilities were available (which they are not), to advance in either the art or the science of medicine.

"There are, of course, men here and there who are exceptions to the rule and who, despite the handicaps of lack of financial aid and lack of modern equipment, are accomplishing problems worthy of record. Among them may be mentioned Bence of Budapest and his study of pigs after gastrectomy. He has produced what appears to be true pernicious anemia, which develops in these animals, not the first, but the second year, after total gastrectomy.

Research at Low Ebb

"Suffice it to say, as far as medical research is concerned, that at present it is generally at a low ebb, and the reason for this is apparent. It is not from lack of interest of those concerned, but rather from factors which are, we hope only temporarily, out of the control of those concerned.

"The attitude of mind of the younger doctor particularly appears to be filled with uncertainty, not with uncertainty as to whether he wants to be a doctor, but rather uncertainty of opportunity. This was particularly true in Austria and Hungary, where, despite much reduced territory, a large number of men and women are still being educated in medicine, a proportion far above that actually needed for the population. Men, even though talented, cannot long live and work productively without a sense of security, and security at present is well-nigh impossible."

SERA

> Beginning August 1, only five days are to be allowed to elapse between the date of authorization for medical care and the writing of the relief order to pay for the service rendered.

The above order was issued from SERA headquarters August 2.

It means that obstetrical cases cannot be authorized prior to confinement.

Prenatal care may be authorized, but only in terms of the five-day interim.

A series of doctors' visits cannot be authorized in advance of more than five days and prior authorization for services or care not performed up to August 1 were cancelled on that date. New requests for authorization in accordance with the new ruling were to be made on and after that date.

An exception is made in case of emergency, though in this case, if the doctor has not secured written authorization first, his request will be granted or not according to the discretion of the worker.

Allotment Reduced

"Washington is reducing its allotment for human relief in Minnesota (as in the rest of the country)," says Mr. Benjamin E. Youngdahl, director of Social Service, in explanation of the new ruling. "We must keep our county offices in such a commitment position as to make it possible to liquidate those offices at almost any time in case funds are cut off."

Drastic reduction in relief funds has already been made in many quarters.

Those who were cut off from federal relief have promptly become charges on their local poor boards and county agencies. All physicians should keep in constant touch with the relief situation in their own communities and be ready to make adequate and fairly compensated arrangements with their local authorities for medical care of these people.

Optical Code

The fee schedule for refraction and spectacles for relief patients is as follows, according to a recent bulletin from SERA headquarters:

Refractions	$3.00
With mydriatic drops	$3.50

Materials used are to be billed at cost. The quality is especially designated: the price of frames not to exceed $1.25 and the lenses $1.50 unless very specially authorized.

Thus, when the doctor presents the relief order to the relief office for payment he must attach to the order a copy of the prescription covering the glasses ordered and on the reverse side he must itemize his bill as follows:

Refraction	$3.00
Lenses	1.50
Frame	1.25
Total	$5.75

If a client qualifies for these services under the spirit of the emergency program he may be directed to an optician or to an oculist for an examination. The doctor will be paid for the refraction whether or not he prescribes glasses. If he finds that glasses are necessary he will prescribe according to his findings and have the prescription filled in accordance with the materials specified by a reputable house.

Medical Care for WPA Workers

All employees of the Works Program Administration (WPA) will receive compensation for disability or death resulting from injuries sustained in the performance of duty; also medical and hospital care for such injuries, regardless of whether or not they result in disability or death.

This provision was included in the Emergency Relief Appropriation Act of 1935.

Administration of these benefits will rest with the United States Employees Compensation Commission which was established in 1916 to administer compensation and disability benefits to all federal civil service employees under the Federal Employees Compensation Act of that year.

The benefits extended under the Emergency Relief Appropriation Act of 1935 are subject to special limitations and conditions.

Note the following:

1. To warrant payment of disability or death benefits or payment for medical or hospital services, the employee *must have been injured in the performance of duty.*
2. The total aggregate compensation to be paid to any individual cannot exceed $3,500.
3. The monthly compensation shall not, in any event, exceed $25 a month.
4. There are to be no minimum limits on amounts of compensation or monthly payments such as there are for federal civil service employes under the Act of 1916.

None of the above limitations applies to employees on the administration or supervisory payroll but only to employees receiving so-called "security payments," that is, wages from the appropriations.

Supersedes SERA Division

The Safety and Compensation Division of the SERA which is providing medical and hospital service for relief worker employees on projects now being terminated to make way for the WPA will be superseded by local representatives of the United States Employees Compensation Commission.

Where, formerly, funds to pay for medical care for injured relief workers were derived from a revolving fund composed of money set aside from each month's relief appropriations within the state, they will come from a national appropriation for the WPA workers and are therefore on a much more assured basis.

Regulations

Treatment must be furnished in United State medical establishments wherever practicable.

In locations where these facilities are not available, the State Compensation Officer or his local representative will make arrangements for medical care by reputable private physicians.

Only qualified, licensed doctors of medicine are eligible for this work.

The cases will be distributed as equitably as possible among these physicians. A cumulative list must be kept by local representatives of the commission so as to show the number of cases referred to each physician.

Fees will be paid direct to the physician from the Commission in rates that are "not in excess of the minimum charge prevailing in the community for similar services."

Hospital Service

Hospitals will be paid in accordance with a fee schedule agreed upon with the National Hospital Association.

The physician authorized to treat the injured employee may designate the hospital where the injured employee is to be sent provided the hospital accepts the agreed upon rates.

The attending physician may also engage special nursing service upon his own authorization where such service is absolutely necessary.

Authority for treatment or hospitalization must be issued and signed personally by the proper issuing officer.

Delayed Relief Bills

Physicians who are treating relief clients, under the program now being terminated, should submit all their bills promptly with the proper authorizations. Furthermore, they should report any undue delay in receiving payment to their councilors and to the State Office.

Complaints made at the Annual Meeting at Minneapolis of excessive delays in receiving payment for service to relief clients were taken up by Secretary E. A. Meyerding with Mr. L. P. Zimmerman, acting administrator of the SERA.

Mr. Zimmerman assured Dr. Meyerding by letter that funds were available and that physicians would receive payment for approved services.

"Undoubtedly," he said, "the routine of auditing invoices, together with delay in receiving same, is the reason for delay. However, we are making a special case of this matter and will see to it that medical bills are paid at the earliest date possible. I appreciate your calling this to my attention and would ask you to kindly keep me notified regarding it."

The complaint was also referred by Mr. Zimmerman to Mr. C. H. Zealand, director of the Division of Safety and Compensation, who noted that a change in accounting procedure had caused an unavoidable delay for a time in payment of medical bills under the SERA self-insurance plan.

Physicians Are Slow

Mr. Zealand's greatest difficulty has been, however, to persuade the attending physicians themselves to submit their bills.

"If you have any information on specific instances of delay we would appreciate receiving particulars so that we may trace and remedy the situation complained of. It is possible the criticism has reference to medical expenses incurred in connection with the rehabilitative program rather than on account of the work of this division. This we could ascertain on receipt of more detailed information.

"At this time we wish to express our sincere appreciation to the State Medical Society for the wonderful coöperation we have received."

For Public Health

As this issue goes to press, the annual appropriation of $8,000,000 for promotion of public health programs to the states under the Social Security Act and the supervision of the United States Public Health Service is a virtual certainty. Funds held up at this session will undoubtedly be provided in January.

What will this federal appropriation mean for Minnesota?

To sum it up informally, it will mean that considerable sums of money can be secured from the federal government for a variety of public health projects that were formerly impossible for lack of funds.

These projects must meet with the approval of the United States Public Health Service. The United States Public Health Service must also be shown that adequate facilities and personnel are available and already organized for the task first. Furthermore, the state must match, dollar for dollar, a large part of the federal funds to be expended.

Training Necessary

Theoretically these funds become available as soon as they are made available by Congress. It is obvious, however, that much organization and considerable training of personnel to meet the requirements will be necessary before even the best organized of states can expect to make use of the funds.

It is obvious, also, that this is the time to lay a sound foundation for this organization and training. This is the time for conscientious, careful and thoroughgoing coöperation with the state health officer and his departmeint to the end that the new program—with all its possibilities for good—shall not, instead, unalterably fix upon us unfair practices, lowered professional standards and irremediable damage to public welfare in Minnesota.

Coöperation with Physicians

It was for the express purpose of asking for advice and assistance and for promising the coöperation of his department that Dr. A. J. Chesley, state health officer, appeared before the Council, and, later, before the House of Delegates in Minneapolis.

There seems to be no doubt, whatever, that Dr. Chesley and his department will work honestly and wholeheartedly with the medical profession to build a sound and satisfactory program in Minnesota.

In return, Dr. Chesley has the assurance from the Council that he will have more than nominal assistance from the profession.

It has been the reputation of physicians in the past—sometimes deserved—that they waited, inactive, until others have made the plans and formed the working policies. Then they became loud in their belated complaints.

There is no reason why the medical profession should lay itself open to such criticism in the matter of the new public health program in Minnesota.

Hospitalization by County Boards

The object of the act passed by the 1935 Legislature "authorizing County Boards to provide for hospitalization of the indigent in such counties" was to make it definite and clear that County Boards are not obliged to hospitalize their indigent in the University Hospital.

It applies to the County Board of any county in the state, whether the county has operated under the county, town or permit plan of caring for its indigent.

The above is a résumé of an opinion on the matter by F. Manley Brist, attorney for the state medical association, given in response to questions that have been raised in several counties operating on the town plan.

It is Mr. Brist's opinion that the bill was written to apply to all counties without exception and it is his belief that that was the intention of its framers. He notes, however, that this act does not apply to those cases in which hospitalization is not necessary. Payment for medical and surgical attention that is furnished outside the hospital is the responsibility of Town Boards in counties where care of the indigent is under the town system.

The matter should be referred by local authorities to the Attorney General for a ruling if there is any question, in order that there may be a uniform application of the law.

Distribution of Physicians

There were 574 persons for every physician in the United States in 1886 and in 1931 there were 785 persons for every physician.

This is according to the best figures available, provided in the long awaited study of the distribution of physicians of the United States, recently published by Dr. R. G. Leland, director of the American Medical Association's Bureau of Medical Economics.

Apparently, as Dr. Leland indicates in his comment, these figures would indicate that the number of physicians in relation to population, when a term of 45 years is considered, is decreasing instead of increasing. They do not tell the whole story, however.

During four different two year periods there was a rapid increase in the number with a conspicuous decrease in the rate of growth in most of the intervening periods. It is difficult to tell whether, at the present moment, there is a movement toward a larger percentage of physicians per population or the reverse.

Young Men in the Cities

Thus the statisticians hesitate as yet to uphold the thesis of many physicians and economists, that there is a conspicuous over-supply of physicians.

Here are other interesting facts developed in this study.

There are more than two and one-half times as many people for each physician in communities of less than 5,000 population than there are in cities of 100,000 or over. These figures bear out the repeated observations that physicians tend to congregate in the large centers. The fact that most of the physicians practicing in the large centers are young men with the ages of thirty to thirty-four predominating indicates that it is the young men just graduated from medical school who are going to the cities rather than that there is a movement of established physicians from the smaller to the larger centers.

There is a noticeable difference of distribution between the various states and this difference appears to depend somewhat on the presence of persons having a sufficiently large income to bring them within the scope of the federal income tax.

The percentage of physicians calling themselves specialists is only 16.5 per cent of the total number over the whole United States.

This percentage rises to approximately 25 per cent of all the practicing physicians in some of the larger centers. It is not large, however, compared with Germany, where the percentage in fifty-two cities over 100,000 population is 46.6, and in forty-nine cities from 50,000 to 100,000 is 50.7 per cent.

The number of physicians who graduate and enter practice each year in the United States is approximately 4,000. The number who die, according to the best available figure, is close to 3,500.

There are many interesting phases of this study that cannot be touched upon here. It will repay careful reading and study.

Minnesota State Board of Medical Examiners

Saint Paul Abortionist Receives Four-Year Prison Sentence

State of Minn. vs. Peter H. Nellessen
State of Minn. vs. Constance Lundgren
State of Minn. vs. Harold Wayne
State of Minn. vs. Robert Wallace.

Peter H. Nellessen, 1100 Hand avenue, Saint Paul, sixty-four years of age, married and the father of six children, received a sentence of four years at hard labor in the State Prison at Stillwater, on July 25, 1935, following his entering a plea of guilty to an information charging him with the crime of abortion. Nellessen was sentenced by the Hon. R. A. Walsh, Judge of the District Court for Ramsey County.

Nellessen, whose only medical training consists of eight years as a male nurse at the Soldiers' Home at Minnehaha Falls some thirty-five years ago, had been engaged in the performing of criminal abortions, according to his own statement, over a period of the past forty years. He admitted having operated at Ashland, Wisconsin, Minneapolis and Saint Paul. He stated that he performed about one hundred abortions during the past year. His arrest followed the discovery of a grave in the back yard of a home at 527 Edmund Street, Saint Paul. It was at this home that Nellessen had performed an abortion upon a sixteen year old Saint Paul girl. Nellessen also admitted having supplied and sold to women such articles as pessaries, suppositories, et cetera. He was addressed as "Doctor" although his conversation and appearance would have indicated to an ordinary person anything but that.

The Lundgren woman, together with the other two defendants, was charged with concealing the birth of a stillborn child. The three were sentenced to ninety days each in the Saint Paul Workhouse. This sentence was suspended and they were placed on probation in charge of the probation officer. They coöperated with the authorities in apprehending Nellessen.

The Minnesota State Board of Medical Examiners coöperated with Mr. M. F. Kinkead, County Attorney of Ramsey County, and James F. Lynch, his assistant, in the handling of these cases.

List of Physicians Licensed by the Minnesota State Board of Medical Examiners on July 6, 1935

June Examination

By Examination

Adams, Marvin Edward, U. of Minn., M.B., 1934, Minneapolis.
Anderson, Edward Marvin, U. of Minn., M.B., 1934, Sleepy Eye, Minn.
Anderson, Oliver Wendell, U. of Minn., M.B., 1935, Minneapolis.
Baker, Russell Lowell, U. of Minn., M.B., 1934, Hayfield, Minn.
Barr, Robert Neff, U. of Minn., M.B., 1929; M.D., 1930, Minneapolis.
Bergh, George Sverdrup, U. of Minn., M.B., 1932; M.D., 1933, Minneapolis.
Black, Earl James, Loyola U., M.D., 1934, St. Paul.
Brotchner, Robert Jacob, U. of Minn., M.B., 1935, Saint Paul.
Brown, James Wellington, U. of Minn., M.B., 1935, Minneapolis.
Burch, Edward Parris, II, Johns Hopkins U., M.D., 1933, Baltimore, Md.
Clagett, Oscar Theron, U. of Colo., M.D., 1933, Rochester, Minn.
Darden, William Howard, Duke Univ., M.D., 1932, Northport, Ala.
Eiler, John, U. of Minn., M.B., 1935, Minneapolis.
Ellinger, George Frederick, U. of Minn., M.B., 1934, Minneapolis.
Evans, Leslie Mathew, Marquette U., M.D., 1935, Saint Paul.
Grandy, A. Margaret, U. of Minn., M.B., 1934, Minneapolis.
Hanssen, Egil, U. of Minn., M.B., 1933; M.D., 1934, Minneapolis.
Harlowe, Harold Douglas, U. of Minn., M.B., 1934, Wilmette, Ill.
Havel, Thomas Earl, Creighton U., M.D., 1935, Montgomery, Minn.
Helferty, John Kenneth, Rush Med. Col., M.D., 1934, Tracy, Minn.
Holmberg, Conrad Joel, Rush Med. Col., M.D., 1935, Ortonville, Minn.
Johnson, Malcolm Rossland, U. of Minn., M.B., 1935, Minneapolis.
Katz, Louis Jack, U. of Minn., M.B., 1934, Saint Paul.
Kaufman, Herschel J., U. of Minn., M.B., 1934, Minneapolis.
Kozberg, Oscar, U. of Minn., M.B., 1934, Saint Paul.
Lenarz, Albert Joseph, Marquette U., M.D., 1935, Albany, Minn.
Lohmann, John George, U. of Minn., M.B., 1934, Minneapolis.
Modelevsky, Aaron, U. of Minn., M.B., 1934, Saint Paul.
Moses, R. Rounce, U. of Minn., M.B., 1934, Northfield, Minn.
Nelson, Harlan Forest, U. of Minn., M.B., 1935, Brooten, Minn.
Paulson, Donald Lowell, U. of Minn., M.B., 1935, Saint Paul.
Rozendaal, Hendrik Marinus, U. of Leyden, Netherlands, 1928, Rochester, Minn.
Secord, Eugene William, Yale U., M.D., 1932, Rochester, Minn.
Sibley, William Langley, U. of Virginia, M.D., 1930, Rochester, Minn.
Sjostrom, Lawrence E., U. of Minn., M.B., 1935, Minneapolis.
Spang, Anthony Jennings, Marquette U., M.D., 1935, Duluth, Minn.
Strathern, Carleton Schleuder, U. of Minn., M.B., 1935, Minneapolis.
Vandersluis, Charles Wilson, U. of Minn., M.B., 1934; M.D., 1935, Bemidji, Minn.
Wasson, Loren Francis, U. of Minn., M.B., 1935, Minneapolis.
Williams, Mervyn Morrill, U. of Minn., M.B., 1934, Marshall, Minn.

TRANSACTIONS *of the* MINNEAPOLIS SURGICAL SOCIETY

STATED MEETING HELD MAY 2, 1935
The President, DR. MARTIN NORDLAND, in the Chair

TETANUS*

A Study with Analysis and Report of Thirty-three Cases

Charles E. Merkert, M.D.

Although the average medical practitioner is rarely called upon to treat a case of tetanus, he is nevertheless mindful of this disease in planning his care of the ever-increasing number of traumatic injuries. All of us should be interested, therefore, in an analysis of a group of tetanus cases—particularly a group from our own locality—for one can never know when a serious case of this disease may complicate even a minor laceration under treatment.

The prevention and treatment of tetanus was given major consideration in the care of the wounded during the World War. So important was it considered, that special tetanus commissions were appointed to study the problem. The experience during the war emphasized the importance of intelligent primary wound care with débridement (removal of sequestra and damaged tissues) with primary or delayed primary suture, and also the value of prophylactic injection of antitoxin in single and repeated doses.

That the above measures were of decided value in greatly reducing the incidence and mortality of tetanus in the war wounded was definitely shown by the reports of Bruce[6] and Golla[8] of the British Tetanus Commission, as well as by the reports of the Medical Corps of our own Expeditionary Forces.

Our greatest opportunity to lower the incidence and mortality of tetanus in civil practice seems to depend upon how well we carry on with those preventive measures established as a routine of surgical procedure during the war.

Undoubtedly better wound care and more widespread use of prophylactic antitoxin has resulted from the knowledge gained during this period, and is today a major factor in reducing the number of cases in our own city and state. The mortality records of the Health Department indicate that in Minneapolis and the State of Minnesota, during the period of ten years from 1923 to 1933, the rate of death per 100,000 population due to tetanus is somewhat lower than that of the whole United States registration area. Statistical information on the true incidence of tetanus in this city and state cannot be secured, and only an estimate can be arrived at by realizing that the deaths represent the greater proportion of cases.

The material used in this survey of tetanus was obtained from the records of the Minneapolis General Hospital and the Minnesota General Hospital. It consists of the cases of tetanus during ten years at both institutions up to January 1933. (Not consecutive years at the Minnesota General Hospital.)

It was found that thirty-three cases could be collected, all of which were general tetanus. No cases of only local tetanus could be found. These cases do not represent city injuries only, as many were sent in from throughout the state.

CHART I. TETANUS MORTALITY FIGURES FOR TEN YEARS (CITY AND STATE)

Death Rates Per 100,000 Population
From Division of Public Health (Minneapolis, Minnesota)

Year	Minneapolis Deaths	Minneapolis Rate	Minnesota Deaths	Minnesota Rate	Rate United States
1923	6	1.47	37	1.5	1.7
1924	4	.95	23	.9	1.6
1925	2	.47	25	1.0	1.5
1926	5	1.15	27	1.1	1.3
1927	5	1.13	21	.8	1.3
1928	1	.21	28	1.1	1.3
1929	4	.87	28	1.1	1.2
1930	4	.86	22	.9	1.1
1931	4	.84	24	.9	.9
1932	8	1.66	22	.8	.9
Average	4.3	.95	25.7	1.01	1.28

Mortality.—Of these cases, twenty-one patients died, giving a gross mortality rate of 63.6 per cent. Taylor[23] in a series of thirty-seven cases at the Indianapolis City Hospital and Indiana State Hospital showed a mortality rate of 54 per cent. Bruce's[6] 1,458 cases during the World War showed a mortality rate of 34.8 per cent. However, practically all of his cases had received prophylactic serum. Stone[21] reported seventy-two cases at the Los Angeles General Hospital which showed a mortality rate of 52.7 per cent. Yodh[26] in the *British Medical Journal* reported a series of 102 cases treated with antitoxin intravenously, intraspinally, and intramuscularly with a 64 per cent mortality. A later series of his treated by intrathecal administration of antitoxin into the cysterna magna (112 cases) showed a mortality of 46.5 per cent.

As can be seen, the mortality rate is still very high and many factors such as age of patients, prophylaxis, severity of the disease and manner of treatment must influence the rate in different series.

Age Incidence.—The ages in this series ranged from four to fifty-four years. The average age was twenty-one. I have often heard it said that the prognosis of tetanus in children is especially unfavorable. In the twelve cases under twelve years of age, the mortality rate was 50 per cent. In the twenty-one cases of twelve years or over, the rate was 71.4 per cent. I do not know how to account for this, as the treatment in both groups was similar.

Sex.—There were twenty-six males and seven females. The greater exposure to traumatic injuries of the male can well account for this.

---

*Inaugural thesis.

Incubation Period and Relation to Mortality Rate.—In thirty-one cases in which it could be determined, the incubation period varied from four to ninety-four days. Twenty had incubation periods of from five to nine days. The day of greatest incidence was the sixth. Bruce[6] in his series found the most frequent day the ninth. He also found the mortality rate varied inversely with incubation period length. This series does not definitely show this trend, as can be seen by the chart.

CHART II. INCUBATION PERIOD AND RELATION TO MORTALITY

Day	Cases	Number Lived	Number Died
4	1	0	1
5	3	0	3
6	6	2	4
7	4	2	2
8	4	2	2
9	4	1	3
10	0	0	0
11	0	0	0
12	1	0	1
13	1	1	0
14	1	0	1
16	1	1	0
17	1	1	0
19	1	0	1
20	1	1	0
61	1	0	1
94	1	0	1

Type of Causal Injury.—In some cases the history was meager in regard to the responsible injury. They are as follows:

8 Penetrating wounds of feet by nails or rake
4 Glass lacerations of hands or feet
3 Wood sliver or splinter wounds
2 Abortions
2 Compound fractures
1 each: Manure spreader laceration, laceration of hand on corn shredder, laceration of head by horse's kick, blister on heel, gunpowder burn, nose cut on ash can, finger chopped by axe, frozen fingers, hand in wringer, injury to toe, laceration of ear, and bowel resection for obstruction due to appendiceal abscess.

Of the two cases without history of injury, one patient had broncho-pneumonia.

Contamination by manure and farm dirt can be inferred in many of these injuries. The penetrating character of many of these wounds is noticeable. Taylor in his recently reported series noted the large number of patients who had sequestra in wounds. This series, aside from the wood splinters, does not show this.

Prophylaxis History.—Only one patient in the group received a true prophylactic injection of 1,500 units of antitoxin the day of injury. In that case the incubation period was ninety-four days. One received a prophylactic injection four days after injury and had an incubation period of seventeen days and lived. These two cases demonstrate the usual effect of prophylaxis on the incubation period, as mentioned by Bruce. One patient received antitoxin a week after injury and developed tetanus seven days later. This patient died from what was called anaphylactic shock on being given 20,000 units intravenously the day tetanus developed. None of the other patients received any antitoxin before the onset of symptoms.

Let me repeat that prophylactic antitoxin with good wound care is the most successful way to reduce the incidence and death rate from tetanus. As pointed out by war experience, in long-drawn-out, badly-infected wounds, prophylactic injections should be repeated each week until the wound is healed.[6] It is also advisable to give a prophylactic injection preceding the re-opening of any old infected wound.[6]

Period of Delay Before Treatment.—This varied from one to eight days—the average being 2.5 days. No definite relation of mortality rate to the length of this delay period can be determined.

Before attempting to evaluate the treatment used in this group of cases, it is my intention to discuss briefly my conception of tetanus and its treatment as derived from the literature.

In the second century, Aretæus[2] wrote of tetanus, "With them, then, who are overpowered by this disease I can merely sympathize. This is the great misfortune of the physician." Now let us see how far we have progressed from this.

Many recent authors doubt the value of antitoxin in the treatment of tetanus. The high mortality in most series bears this out. Irons, as quoted by Manson,[13] however, in comparative series with and without the use of antitoxin showed a 6 per cent higher mortality rate in the cases not given antitoxin. Sherrington's[19] experiments on monkeys injected with toxin indicate that antitoxin—particularly when given intravenously or intraspinally—was very effective in preventing death, which otherwise would always occur when no antitoxin was given. But Bruce,[6] from the larger number of cases at his disposal for study, could draw no conclusion as to the value of antitoxin as a curative agent.

The only alternative treatment is that of Bracelli,[15] and its modifications, in which phenol injections are used. Although it is an old treatment, it seems to have been used only on sporadic cases in this country. Bruce[6] states that it was tried in some British hospitals during the war, but did not seem at all effective. Huntington[11] states that Kitasato found it to be without value. It has been used principally by the Italians and, at least as reported by Pilloni[15] in 1931, is to be preferred to the antitoxin treatment. In fifty-three cases, in which the Bracelli treatment was used, his mortality rate was only 30 per cent. This treatment, he stated, was not effective in the fulminating type of case. He minimized the usual criticism of this treatment regarding the effect of phenol on the kidneys.

Savini[16] stated that Bracelli recommended as a daily adult dose 0.5 to 2 grams of phenol, and that continual observation of the urine for smokiness was the guide as to overdosage, which when observed should lead to cessation or material reduction of the dose or extension of the interval. Bryan[5] in Tennessee, at the Vanderbilt Hospital in 1933, reported his use of phenol (1 per cent aqueous solution) in six cases—with no deaths. He mentioned an article by Bracelli, written in 1911, in which the author claimed to have suggested phenol treatment before Behring and Kitasato had undertaken the development of antitoxic serum in 1890. He stated also that Bracelli reported a large series of cases treated with phenol with a surprisingly low mortality rate.

Bates[3] in 1932 reported five cases treated with antitoxin intraspinally and intramuscularly, combined with phenol injections subcutaneously. There was only one death in his cases. Suvansa[22] in 1931 reported fourteen cases treated by intrathecal injection of phenol (1/400 in normal salt solution). In this series there were ten recoveries and four deaths. He uses 12-20 c.c. in children of twelve, and 30-40 c.c. in adults. He stated that Bracelli recommended the administration of 10 c.c. of a 1 per cent solution intramuscularly every two hours, but says that this has not been successful in other hands.

One can conclude from the foregoing that phenol treatment should receive more attention generally, and particularly by those who are convinced that antitoxin is without value. I believe, however, that most of us are not as yet convinced that antitoxin should be discarded in the active treatment of tetanus. Experimental evidence and the superb results of its use in prophylaxis make one hesitate to discard so promising an agent. Much discussion has been presented as to the relative merits of the various routes of its administration. Greater or lesser quantities of antitoxin have been advocated by many authors. The background for this is the objective of placing greater concentration of the antitoxic substance in position to neutralize all of the toxin possible and particularly to protect the central nervous system from toxin in lethal amounts. Our success in this endeavor is only determined by the mortality figures in actual cases. However, there are many obstacles as well as possibilities in accomplishing our purpose that can best be made clear by presenting some of the physiological as well as experimental factors in the problem.

In the first place, it is known that most deaths in tetanus are due to neuro-muscular contractions produced by the action of tetanus toxin affixed to the motor nuclear cells of the spinal cord and medulla.[11] It is also true that, with recovery, permanent damage to this nerve tissue usually does not occur.[11] The problem, then, is to keep the patient alive and he will get well. The toxin, as we know, is an exotoxin produced by an anaërobic spore-forming bacillus (clostridium tetani), first recognized by Necolaier in 1884. Abel[1] recently stated that, assuming the sensitivity of man to be equal to that of the monkey, he hazards the calculation that it would require only 0.01 mgm. of the really pure poison to kill a man weighing 150 pounds. From the infected wound, the toxin is thrown out into the surrounding tissue fluids and into the bloodstream.

From the tissue fluids about the wound, as well as from most other tissue fluids to which it has been carried by the bloodstream, it is generally believed that the toxin is picked up in some manner by the nerve trunks and carried to the central nervous system. Meyer and Ransom, and Marie and Morax,[17,24] believed that the toxin was carried by the axis cylinders of the nerves, but the more tenable theory, as elaborated by Gumprecht and Robertson,[17] is that perineural and intraneural lymphatics carry the toxin centrally. The early appearance of trismus in general tetanus can be explained on the basis of the comparatively short distance the toxin must travel up the motor trunk of the trigeminal nerve.[24] Experimental work indicated that in sensory nerves the lymphatics are blocked at the posterior root nuclei and this could account for the lack of tetanus dolorosa (painful tetanus).[24]

It is also believed that the toxin is transmitted up the spinal cord toward the brain along intraspinal lymphatics.[17] Most authors believe little if any toxin reaches the brain or cord directly through the arterial circulation. However, Abel[1] and his co-workers at Johns Hopkins in 1934, from an experiment (sectioning the sciatic nerve, but with careful resuture of the severed parts so that continuity of the perineural sheath was restored, followed by injection of toxin into the nerve) concludes from this and other data that toxin is not carried up the nerves or their lymphatics and that the only conclusion they can come to is that it is carried to the central nervous system by the arteries. Only a few have found toxin in the spinal fluid, Robertson,[16] Manson[12] and most others having repeatedly found the spinal fluid free of toxin.

The toxin delivered to the brain and cord, as mentioned heretofore, becomes firmly fixed to the tissue and is believed by most authors to be irremovable by antitoxin. It is this last factor that is our greatest obstacle in successful antitoxin treatment, for often by the time a case is diagnosed enough toxin has already become attached to produce the fatal muscular contractions. This being true, our greatest hope of saving such patient is by sedation directed towards the involved nerve tissue and our greater attention is directed to this part of treatment.

It would seem, however, in spite of the amount of the fixed toxin, that an attempt to neutralize the as yet unfixed toxin as well as to shut off the continuation of supply from the focus is a logical procedure. This presents problems.

Let us divide the toxin present in an active case of tetanus into four portions:

1. That already fixed to the cells of the brain and cord.
2. That in general tissue fluids in most lymphatics, and in the bloodstream.
3. That in transit along the main nerve trunks and along the lymphatics of the cord (accepted by most authors).
4. That portion most recently elaborated by the focus and as yet in the wound and immediate vicinity of the wound.

It would seem that whatever success is derived from antitoxin treatment comes from the neutralization of the last three portions of the toxin. The second portion (in bloodstream and tissue fluids) has been proven to be neutralized by all of the various routes of administration of antitoxin. The intravenous route should be the quickest and most effective way to accomplish this, although the most dangerous from the standpoint of anaphylaxis.

The third portion (in transit in nerve trunks, et cetera) is potentially the most dangerous of the free toxin, as it is well on its way to fixation. It also appears to be in a protected position from the antitoxin placed in the blood and general tissue fluids. Whatever antitoxin travels up the same route (and some experimental evidence casts doubt that any does) can be of small value in neutralizing the toxin on the way. Permins' experiments in animals indicate that intraspinal injection of antitoxin does prevent the onset of local tetanus.

Some authors indicate their belief that the spinal canal is a closed cavity and in no way could antitoxin get from it directly to the nerve tissue or lymphatics of the nerve roots or cord, and that this route has been used on account of its mere propinquity to the spinal cord.[5,25] It occurred to me that spinal anesthesia—and particularly the regional localization possible with spinal anesthesia—very clearly refutes this idea. That the variation in physical properties of the procaine and antitoxin molecules may result in the ability of one to approach and enter the cord or nerve roots and the other to be excluded, is conceded. However, definite proof that antitoxin cannot travel from the spinal fluid to the cord or nerve trunks as does procaine seems lacking.

Huntington[11] suggests that possibly intraspinal antitoxin causes a non-specific inflammation of the nerve roots with a resulting blockage of the lymphatics which prevents the flow of toxin to the central nervous system. Whatever the mechanism, it seems that intraspinal antitoxin might be of greatest value against this third portion of toxin. Greater concentration of antitoxin injected into the cysterna magna, as advocated by Yodh,[26] by this reasoning would seem of value to protect the more vital centers.

Taylor,[23] however, in discussing the recent paper of Miller and Rogers, states that he is glad to hear the authors voice their protest against intrathecal administration. Some authors have criticised intrathecal antitoxin administration on account of the meningeal irritation produced.[23] Wainwright[25] stated that intraspinal injections are harmful, increase mortality, and should be abolished. Robertson[16] recently stated, in answer to my question as to whether or not he had found from his studies basis for advocacy of intraspinal antitoxin, "I have never, under any circumstances or in any manner advocated intraspinal injections of antitoxin; quite the opposite, as a matter of fact, because repeatedly I have stated that it seemed a waste of valuable therapeutic effort." He also stated that many outstanding authorities are of a different opinion. "The proof," he also said, "is not an easy one to elicit in a sufficiently strong manner to settle the matter definitely." However, Bruce[6] advocated intraspinal therapy over intravenous—particularly on account of the danger of anaphylaxis in the latter.

The fourth portion of toxin can best be taken care of by injection of antitoxin about the wound and in conjunction with this, by adequate wound care with excision or wide incision and removal of necrotic tissue and sequestra. In the recent Indiana series, Taylor[23] particularly stressed the value of even opening healed wounds and also commented on the large number of concealed sequestra found where wound opening was done routinely. He also noted the rapid improvement after sequestration in some of the cases. In his discussion of the paper by Miller and Rogers,[14] he stated that all tetanus cases should enter the hospital by way of the operation room and that here the local wound should be excised if possible; if not, it should be thoroughly explored and a débridement done—even on healed skin lesions.

Other factors in the mechanism of tetanus, such as metabolic disturbances and studies of the neuromuscular phenomena, have a bearing on treatment.

Huntington[11] states that Krinzki found a fall of 30-50 per cent in the calcium content of the serum during the course of tetanus and remarked that this needs further study. Yodh[26] in his series used calcium in all cases from the start as a preventive for serum reactions, believing that the small number of reactions encountered was due to this.

Heim[10] noted first a rise, then a lowering, of sodium content of the serum in tetanus. In 1929 he stated that as a result of motor spinal center irritation, due to tetanus toxin, the resultant muscular contractions produce lactic acid, and, as Meyerhof revealed, an increase in hydrogen ion concentration in the muscles. To this he attributes the severity of the continued muscular contracture. For this reason he administered sodium bicarbonate to his cases. He gives 20 to 50 c.c. of 10 per cent solution intravenously and 10 to 30 grams by mouth. He stated that the result was surprising. Within fifteen to thirty minutes he noted some muscular relaxation reaching a climax usually in one hour, then gradually disappearing, giving way to the former condition in three to five hours. On daily administration, the effect was increased in intensity and duration. In nine cases in children using this treatment along with antitoxin and other sedation, he had two deaths.

In contrast to the above is the following work gathered by Huntington.[11] Observations by Shizaka indicate that tetanus contracture seems to maintain itself without undue expenditure of energy, the muscle actually accumulating glycogen, showing a low metabolism. This, he states, would seem to indicate that some profound alteration in the muscle in contracture must have taken place. Liljestrand and Magnus showed that in early tetanus the muscular stiffness can be abolished by novocaine, the spinal reflexes remaining present. Ranson's work showed, however, that, after contracture had been present for a day or so, neither novocaine nor trans-section of the posterior nerve roots will abolish it and Ranson concluded that tetanus toxin is a general poison to the nervous system. Huntington cited evidence demonstrating that both experimentally and clinically no action current could be found in

CHART III. FULMINATING CASES

Case	Age	Period	Antitox.	Most Anti-toxin	Type of Death	Remarks
L. S.	6	7	66,000	Is.	Convulsive	
A. K.	12	6	11,000	Iv.	Prob. toxic	Wood sequestrum removed.
R. W.	11	14?	20,000	Iv.	Anaphylactic	1500 U serum 8 days previous.
T. W.	6	6	41,500	Is.	Convulsive	1500 U serum to wound area.
G. W.	41	?	90,000	Iv.	Convulsive	No history of injury. Had bronchial pneumonia.
R. M.	52	19	130,000	Iv.	Convulsive	Frozen fingers.
E. G.	24	7	none	. .	Convulsive	Died on first attempt to insert rectal tube.
R. C.	32	5	none in H.	. .	Convulsive	10,000 U serum day before admission to hospital.
I. J.	30	8	31,000	Iv.	Respiratory	20,000 U was given during 4 days before admission, Im.

CHART IV. PATIENTS THAT DIED BUT RECEIVED ANTITOXIN AT HOSPITAL ON AT LEAST TWO DAYS

Case	Age	Incub. Period	Days Lived	Hosp. Days	Antitox. 2 Days	Most A. T.	Remarks
W. S.	14	4	4	2	60,000	Iv.	Convulsive death.
J. S.	54	12	4	2	185,000	Iv.	Necrotic tissue removed from wound. Positive skin test. Had serum rash.
J. S.	41	9	8	3	95,000	Iv.	5000 U about wound.
J. M.	28	8	10	8	200,000	Iv.	Avertin used.
A. L.	4	5	4	3	80,000	Im.	30,000 Iv., 10,000 Is., 40,000 Im.
A. P.	30	9	7	4	60,000	Iv.	Avertin used, also Mg. Sulph. Im.
I. S.	22	5?	5	4	110,000	Iv.	Scab removed from wound. Dichloramine.
G. R.	34	94	2	4	15,000	Iv.	Had proph. 1500 U day of injury. Cpd. fracture. Probably anaphylaxis.
M. E.	12	6	2	8	180,000	Is.	Cpd. fracture.
R. W.	5	6	3	2	133,000	Is.	3000 U about wound area.
M.D.	11	61	4	2	210,000	Iv.	
C. S.	38	9	3	3	30,000	Iv. & Is.	Wound incised and iodine applied.

tetanus contracture, differing from decerebrate rigidity in which these currents are always found. Other workers agree but show that when such a muscle is stretched, or a convulsion occurs, currents can be demonstrated. Huntington states that it might be thought that muscle contracture in tetanus could be explained by interference to the upper motor neurones, but that then the specific affinities of toxin for certain centers and the phenomena of local tetanus become very difficult to explain. Ranson showed microscopic changes in the sarcoplasm of muscles under contracture for several days, which he believed to be specific. He was unable to demonstrate any change in the lactic acid content. Melzner was not able to relax muscle contracture in mice with three to four times the lethal dose of curare. With others of the same mice he was able to produce more complete relaxation with nonlethal doses of avertin.

With the above discussion in mind, let us attempt to appraise the treatment in this series—first in regard to antitoxin.

It must be stated at once that no evaluation of the advantage of any particular route can be made from this series, as practically all were treated by combined intravenous, intraspinal, and intramuscular routes.

For the purpose of analysis, I have arbitrarily divided the series into groups. The patients in the first group lived long enough to receive antitoxin on only one day at the hospital, or died before any could be given. In this group are nine cases. They died mainly in convulsive seizures. One patient died from anaphylactic shock. These patients received from none to 130,000 units of antitoxin before death. The average amount given was 44,400 units. In this group it would seem that larger doses of antitoxin could not have favorably affected the result. The use of greater sedation to prevent fatal muscular spasms and convulsions and also routine preliminary testing to prevent anaphylaxis possibly might have prevented some of these fatalities.

The rest of the cases are divided into two groups —patients who lived, and patients who died. I have determined in each case in both groups the amounts of antitoxin received during the first two days of treatment, as it would seem that on these amounts of antitoxin administered during this period one can best evaluate its efficacy in treatment rather than on the total amount received—for the patients who lived naturally received *in toto* more antitoxin because they lived longer

As the chart shows, the twelve patients who died received from 15,000 to 210,000 units in the first two days, the average being 113,000 units. The twelve patients who lived received from 35,000 units to 240,000 units of antitoxin in the first two days, with an average amount of 107,000 units.

The only conclusion that I can draw from these figures is that I can see no optimal dosage of antitoxin to obtain good results. I also cannot see any advantage in the more heroic dosages with the present antitoxin.

In both of these groups the route used for the largest portions of antitoxin was by vein in the majority of cases. Where the largest amount was given intraspinally, the results were not more favorable and vice versa. The difficulty in appraising the value of antitoxin is apparent. Certainly, without its use the mortality rate would have been higher. Fixed toxin prob-

CHART V. PATIENTS THAT LIVED

Case	Age	Incub. Period	Hosp. Days	Antitox. 2 Days	Most A. T.	Remarks
E. B.	8	16	14	140,000	Iv.	
F. H.	8	8	14	80,000	Iv.	
A. A.	45	13?	37	171,000	Iv.	Followed resection of black obstructed bowel. Old append. abscess. P. O. ileus.
C. P.	10	6	23	130,000	Is.	
C. O.	8	6	30	35,000	Iv.	Wound opened. 5,000 U. about wound.
V. A.	30	7	86	125,000	Is.	5,000 U. about wound. Developed peripheral neuritis.
H. P.	10	?	25	35,000	Iv.	No history of injury.
G. W.	19	8	28	58,000	Iv.	Wound excised and 5,000 U. about area.
L. M.	4	20?	13	45,000	Iv.	5,000 U. about wound.
L. D.	12	7?	32	130,000	Iv.	Encephalitis symptoms long after recovery.
H. G.	30	17	62	80,000	Is.	Amputation hand for gas bacillus day before onset. Proph. 1,500 U. 4th day.
E. M.	14	9	29	240,000	Iv.	Wound incised. Had serum rash.

ably accounts for its failure in such a large percentage of cases.

Turning from the serum treatment, I wish to briefly discuss the sedatives and anesthetics used in this series. A great variety of these agents were used. In the earlier years chloral hydrate by rectum and by mouth was favored and appeared only fairly effective. Morphine was occasionally used. Magnesium sulphate intramuscularly, intravenously and intraspinally was moderately employed, and luminal and bromides used slightly. In the cases in later years, avertin and sodium amytal have been used. One can see no startling change in mortality rate when these last two were employed, although many authors have recently reported very favorably on their use in occasional cases.

Avertin, first used as an anesthetic by Eichholz,[11] has been very successfully used in brain surgery by Dandy[7] at Johns Hopkins. He reported its employment in upward of 250 major cranial operations without mortality due to the anesthetic, no instance of postoperative pneumonia, and no deleterious effect either immediate or remote. Avertin, he states, is not foolproof but is safe if used with good judgment. He has used avertin as a basal anesthetic, supplementing it where necessary with other agents such as ether and local anesthetics. He used usually 90 to 95 mgms. per kilo of body weight, and rarely more than 100 mgms. per kilo. Harmsen and Higgens[9] in Missouri in 1934 reported four patients with tetanus treated with antitoxin and avertin, of whom three lived and one died. Huntington records eleven cases reported in Germany and one case of his own in which avertin was used. Eight of the twelve lived. He used in his case 60 to 89 mgms. per kilo twice daily. He believes one must use enough to control convulsions and not merely to slightly quiet the patient. As he states, "One wants as an ideal symptomatic treatment, not a hypnotic, but a suitable anesthetic. The ideal one should have a protracted effect. It also should be rapidly and completely eliminated. The barbiturates lack this last property. Avertin seems the best sedative at the present time." In March, 1935, Boyce and McFetridge[4] of New Orleans reported forty cases of tetanus treated with avertin and antitoxin at the Charity Hospital with fourteen deaths, a mortality rate of only 41.6 per cent. Of fifteen cases treated personally by these authors in the last two years, using a routine treatment in which avertin and antitoxin were employed, only five died, a mortality of 33.3 per cent The chief dangers in the use of avertin appear to be reduction in blood pressure. Dandy[7] does not advise use of ephedrine, if this occurs. Occasional hepatic and renal damage has been noted.

In 1931, Smith and Call[20] in Indiana reported very satisfactory control of convulsions in tetanus by fairly large doses of sodium amytal by vein and by mouth. They used it on four cases in conjunction with antitoxin with uniformly good results.

The doses of the various anesthetics and sedatives are of great importance, and, as mentioned, should be sufficient to control the convulsions if possible. This is an individual problem in each case. The doses of these varied greatly in this series and the records were not clear as to the degree of sedation and the effect on the muscular phenomena. It is my opinion that in the treatment of tetanus greater study of anesthetics and sedatives is necessary.

Aside from drug sedatives, the general measures such as quiet surroundings, darkened room, general supportive treatment were carried out in this series and are of importance.

Last but not least in value is the care to the wound. In seven patients the wound was opened after tetanus developed. Four lived and three died. No large number of sequestra were found as in the Indiana series.[28] Some healed wounds were not touched and possibly they should have been opened and drained. In one case the onset and prompt cessation of tetanus symptoms came the day after the amputation of a badly-infected hand that contained a gas bacillus infection as well as tetanus, demonstrating the value of the total removal of the focus of the toxin production.

Injections of antitoxin about the wound were recorded in four patients who lived, and in three who died. To me this seems to show the value of this procedure and indicates that it should be used routinely where possible.

I feel that I cannot conclude this paper without at least mentioning one phase of tetanus study that has received much attention, as judged by the literature, during the last few years. I refer to the work in the production of various types of tetanus toxoid and its possibilities for use in immunization against tetanus.

Conclusions

1. Tetanus deaths are best prevented at the time of injury by suitable wound care and use of prophylactic antitoxin.
2. Tetanus death rate in Minneapolis and Minnesota over a ten-year period is somewhat lower than the rate for the whole United States.
3. Acute general tetanus does not respond to treatment very well and has a large mortality rate (63.6 per cent in this series).
4. The phenol treatment possibly should receive more attention.
5. The use of antitoxin should not be abandoned, but more heroic doses do not seem indicated, and the best route of administration (not determinable by this series) is the intravenous.
6. More adequate sedation should be given and further study of anesthetics and sedatives is needed to prevent convulsive deaths.
7. Injection of antitoxin about the wound and adequate wound care after tetanus develops are important and valuable in the treatment of tetanus.

Bibliography

1. Abel, J.: On poisons and disease and some experiments with the toxins of the bacillus tetani. Science, 79:121-129, (February) 1934.
2. Aretæus: (Ralph Major) Classic Descriptions of Disease, p. 62, 1932.
3. Bates, C. O.: Treatment of traumatic tetanus with report of five cases. Am. Jour. Surg., 18:58-61, (October) 1932.
4. Boyce, F. F., and McFetridge, E. M.: The rationale of the therapy of tetanus with special reference to avertin. Int. Surg. Digest, 19:131-144, (March) 1935.
5. Bryan, W. A.: Phenol in treatment of tetanus. Jour. Tennessee State Med. Assn., 26:242-246, (June) 1933.
6. Bruce, Sir David: Tetanus. Jour. Hygiene, 19:1-32, 1920.
7. Dandy, W. E.: Avertin anesthesia in neurological surgery. Jour. A. M. A., 96:1860-1862, (May 30) 1931.
8. Golla, F.: An Analysis of recent tetanus statistics. Lancet, 193:966-971, (Dec. 29) 1917.
9. Harmson, F. A., and Higgens, H. L.: Tetanus treated with antitoxin and avertin. Missouri State Med. Jour., 31:8, (August) 1934.
10. Heim, P.: On the treatment of tetanus in childhood. Monatschr. fur Kinderheilkunde, 42:251-254, 1929.
11. Huntington, R. W.: Treatment of tetanus. Yale Jour. Biol. and Med., 3:207-233, (January) 1931.
12. Manson, M. H.: Personal communication.
13. Manson, M. H.: Treatment of tetanus and gas gangrene. Minn. Med., 14:142, (February) 1931.
14. Miller, R. H., and Rogers, H.: Present status of tetanus. Jour. A. M. A., 104:186-191, (Jan. 19) 1935.
15. Pelloni, S.: The treatment of Bracelli for tetanus. Policlin. sez. prat. Roma, 38:510-513, (April 13) 1931.
16. Robertson, H. E.: Personal communication.
17. Robertson, H. E.: The distribution of tetanus toxin in the body. Amer. Jour. Med. Sci., 152:31, (July) 1916.
18. Savini: Quoted by Gibson: Comparative value of the methods of treating tetanus. Am. Jour. Med. Sci., 152: 781.
19. Sherrington, C. S.: Observations with anti-tetanus serum in the monkey. Lancet, 193:964-966, (Dec. 29) 1917.
20. Smith, E. R., and Call, H.: The value of sodium amytal in the treatment of tetanus. Jour. Ind. State Med. Assn., 24:472-474, (Sept. 5) 1931.
21. Stone, W. J.: Section on Tetanus. Cecil Medicine, p. 107-114, 1927.
22. Suvansa, S.: Treatment of tetanus by intrathecal injection of ant. Lancet, 220:1075-1078, 1931.
23. Taylor, F. W.: Study of treatment in acute tetanus. Jour. A. M. A., 102:895-898, (March 24) 1934.
24. Teale, F. H., and Embleton, D.: The paths of spread of bacterial exotoxins with special reference to tetanus toxin. Jour. Path. and Bact., 23:50, 1919.
25. Wainwright, J. M.: Tetanus, its incidence and treatment. Arch. Surg., 12:1062-1079, (May) 1926.
26. Yodh, B. B.: Observations on the treatment of tetanus. British Med. Jour., 3742:589-592, (Sept. 24) 1932.

Supplementary References

1. Ashhurst, A. C.: Report on tetanus. Arch. Surg., 1: 407, 1920.
2. Babcock: Surgery, 1929, pp. 149-152.
3. Bozzi, E.: Prognostic and therapeutic consideration of 320 cases of tetanus infection. Osp. Maggiore, 20:213-221, 1932.
4. Casaubon, A.: Tetanus in children. Arch. Argent de pediat., 3:386, 1932.
5. Cooper, N. A.: Analysis of 102 consecutive cases of tetanus. Lancet, 193:930-931, (Dec. 22) 1917.
6. Cornwall, L. H.: War tetanus. N. Y. Med. Jour., 106: 773-777, 1917.
7. Davidson, T. C.: Anaerobic wound infection. Jour. Med. Assn. Georgia, 20:207-213, (June) 1931.
8. Fantus, B.: Therapy of Cook County Hospital. Jour. A. M. A., 102:2021-2022, (June 16) 1934.
9. Graves, A. M.: Tetanus in New Orleans. Ann. Surg., 92:1075-1086, (December) 1920.
10. Grenet, H., and Vogt, C.: A case of tetanus in the newborn. Cure Arch. de Med. d. enf., 32:86-89, 1929.
11. Haynie, J.: Tetanus: diagnosis, prevention and treatment. Jour. Okla. State Med. Assn., 25:9-13, (January) 1932.
12. Ireland, J.: Large therapeutic doses of antitoxin. Am. Jour. Surg., 11:336, (February) 1931.
13. Jacobson, M., and Pierce, H.: The serum therapy of tetanus. Ann. Surg., 44:321-366, 1906.
14. Lacy, G. R.: Isolation of tetanus bacilli from the cerebro-spinal fluid. Jour. Lab. and Clin. Med., 7:100, (October) 1921-22.
15. McGregor, F. H.: Tetanus, its frequency, prevention and treatment. Jour. Okla. State Med. Assn., 24:47-50, (February) 1931.
16. Mattson, C. H., and Starkey, T. A.: Tetanus following induced abortion. Minn. Med., 14:737-739, (August) 1931.
17. Meffert, K.: The treatment of tetanus with subdural injection of tetanus serum. Zentralbl. für Chir., 55:12-15, (Jan. 7) 1928.
18. Palma, R.: A case of recurrent tetanus. Ann. ital. di chir., 10:101-107, (Jan. 31) 1931.

19. Ransom, F.: A modern view of tetanus. Lancet, 193: 928-930, (Dec. 22), 1917.

20. Saegesser, M.: Magnesium sulphate in the treatment of traumatic tetanus. Schweiz. med. Wchnschr., 1:306-309, 1932.

21. Sandford, A. H.: Tetanus and the war. Bull. Internat. Assn. Med. Museums, No. 7, (May) 1918.

22. Seifert, E.: Avertin treatment and specific treatment of traumatic tetanus. Bruns' Beitr. z. klin. Chir., 156:1-6, (July 20) 1932.

23. Thomas, C.: Tetanus antitoxin: A study of local and general reactions in 1884 cases. Texas State Jour. Med., 27:26-27, (May) 1931.

24. Vener, Bower, and McKellop: Clinical tetanus—131 cases. Calif. and West. Med., 39:309-312, (November) 1933.

25. Wolf, A.: Avertin in traumatic tetanus. Zentralbl. f. Chir., 56:2200-2202, (August 31) 1932.

26. Wright, J. E.: Tetanus, Calif. & West. Med., 36:37-38, (Jan.) 1932.

Discussion

Dr. Kenneth Bulkley: I wish to congratulate the essayist for his excellent presentation. As far as my recollection goes, the subject of tetanus has not previously been presented to this organization. I wish further to congratulate the Minneapolis Surgical Society for having had the opportunity to hear this paper and for having elected to its membership an individual capable of producing work of this character. I sincerely trust it will not be his last effort.

Despite the fact that the subject has been covered quite thoroughly, there are certain points which I would like to emphasize and a few others which I would like to mention which, if my recollection is correct, were not brought out in this paper. Tetanus is prevalent the world over, certainly in all inhabited communities. It is, as you know, a common inhabitant of the intestinal tract of many animals and is not uncommonly an inhabitant of the human intestinal tract. A study made in Chicago in 1932 showed that about one per cent of otherwise normal individuals, as far as urbanites were concerned, harbored tetanus bacilli, and a considerably higher proportion of suburbanites. In this country it is generally thought to be more prevalent in the Hudson Valley region of New York State and in Long Island, New York, than elsewhere, and it is generally conceded that it is more prevalent along the Atlantic seaboard than elsewhere. Tetanus is not going to disappear despite any future effort of preventive medicine. The spores are the most resistant known. Active bacilli have been grown from a dry nail which eighteen years previously had been dipped into a tetanus culture. The spores have been known to survive boiling for an hour and to have survived immersion for fifteen hours in five per cent phenol.

Many other points of entry other than those listed tonight have been described. It has developed following many different clean operative procedures; it has been reported following the insertion of a Steiman nail in a simple fracture; it has developed secondary to flea bites; it has followed the bad habit of "nose picking"; it has been reported following the careless trimming of toe-nails. There has been much discussion in the literature as to whether the development of tetanus following a so-called clean operative procedure cannot be ascribed to spore-bearing catgut. The probabilities are, however, that contamination in these cases, particularly in a herniotomy, is from skin and not from catgut.

As far as treatment is concerned, I still feel that our sole reliance should be placed upon tetanus antitoxin, although it has always been somewhat questionable in my mind as to whether the extremes of dosage are justified. I believe the highest dose reported in the literature is that given to an eighteen year old boy in Cardiff, Wales, who had as extensive tetanus as one could imagine. He ran a high temperature for over six weeks following a nail wound of the foot, and received, in all, 1,800,000 units of tetanus antitoxin with recovery. Personally, I feel that the antitoxin should be given by the three recognized routes, appreciating fully, however, that there has been much written, particularly recently, against its intraspinal use. I have had no experience with the use of carbolic acid in tetanus but agree with the essayist that the favorable reports in the literature made by men who have used it extensively certainly justify further study of its use. Following severe convulsions in tetanus the patient not infrequently goes into a state of apnea which, at times, is permanent. I would suggest that under such conditions artificial respiration be used inasmuch as there are in the literature a number of reports of individuals not only temporarily thus kept alive but eventually recovering.

I would also emphasize the point made by the essayist as to the general treatment of these cases, in the avoidance of all external stimulæ. Commonly minor stimulæ such as turning down a sheet, turning on an electric light or the clicking of a door-knob can throw these patients into a convulsion. In children I believe it wise to use a little inhalation chloroform before each injection even though only subcutaneous. The essayist tonight mentioned, but I believe only rather casually, the use of magnesium sulphate in the treatment of tetanus. Dr. S. J. Meltzer of New York advocated in 1899 the use of magnesium sulphate as an anesthetic. In 1906 Dr. Jos. A. Blake, having utilized magnesium sulphate for anesthesia in humans, decided to utilize it in a case of tetanus and, with your permission, I am going to read you his description of this case.

"The patient, a boy fifteen years of age, weighing 115 pounds, was admitted on November 3, 1905, with the following history. Nine days before admission he had crushed off the ends of the first three fingers of the left hand. Two days before admission he began to have stiffness of the jaw and neck, and could not open his mouth. He also complained of pain in the back of the neck. The initial symptoms consequently developed seven days after the injury.

"On the day of admission, the jaws could be separated for three-quarters of an inch; the sternomastoids were prominent and in spasm; flexion and extension of the neck were not painful; lateral motion was painful and limited. The following day there was little increase in the symptoms. That morning Dr. Walton Martin, under nitrous oxide ether anesthesia, dressed the fingers by curetting and cutting off necrotic fragments of tissue and swabbing them with tincture of iodine. At the same time he injected into the spinal cord, introducing the needle between the fourth and fifth cervical vertebræ, forty cubic centimeters of tetanus antitoxin, and an additional twenty cubic centimeters into the median cephalic vein. That night the temperature rose to 102°, there was increased stiffness of the neck, the jaws could not be separated so widely, and spasm of the vertebral muscles developed. There was a marked urticarial rash. Twenty cubic centimeters more of antitoxin were injected into the median basilic vein.

"On November 5, the day following, the rigidity of the jaws and neck had increased; risus sardonicus was present; there were commencing spasms of the muscles of the legs and well-marked opisthotonos. That afternoon, thirty-five cubic centimeters of antitoxin were injected into the spinal canal by lumbar puncture. The same night his temperature reached 104.4°.

"On November 6, the second day following the first injection of antitoxin, there was marked, almost constant, opisthotonos, but the contraction of the masseters had not increased. The temperature during this day was high, between 103° and 104°, the pulse between 104 and 112, and the patient was evidently feeling the strain of the severe pain and almost constant convulsions. In twenty-four hours, twenty-four minims of Magendie's solution had been required.

"His condition being very grave, it was decided to try magnesium sulphate. At 12 noon, 4.5 c.c. of a solution of magnesium sulphate (25 in 100 of water) were injected by lumbar puncture—the usual amount for producing anesthesia. Two and three quarter hours after the injection, the patient was stuporous; the spasm of the neck was lessened; the opisthotonos was gone; there was no response to pricking of any part of the body and extremities; pricking of the face seemed to produce pain; the legs were paralyzed.

"Six hours after the injection, the jaws could be opened wide; the stiffness of the neck and back had disappeared, sensation was present in face, trunk and legs; the arms and legs could be moved slightly; there was no pain, and the temperature had fallen to 102.6°, the pulse to 104; the respirations were 14. The patient seemed drowsy, but took nourishment well, swallowing without difficulty. Nine hours after the injection, the temperature rose to 104°, but responded to an alcohol sponge, and fell during the next twenty-four hours to 101°.

"On November 7, the day following the injection, the tonic convulsions were absent until evening. During the day there were occasional clonic convulsions, but the patient was fairly comfortable, except for some pain in the back. At 9:00 p. m., thirty-three hours after the injection of the magnesium sulphate, its effects seemed to have entirely disappeared, the jaws and neck were rigid, there was constant opisthotonos, and the pupils were contracted. Accordingly, another injection of the same amount was made. In an hour he was more comfortable, the convulsions being less. In two and a half hours he was relaxed and asleep. Six hours after the injection, he could move his arms and legs; there were only occasional slight spasms. During the next day, November 8, there was a steady increase in the spasmodic contractions, yet they were not severe, and he passed a fairly comfortable day and night, taking his nourishment well. The temperature still remained high. By the morning of November 9, the opisthotonos had returned, there were frequent convulsive movements, marked rigidity of the jaw and neck muscles, and risus sardonicus. Lumbar puncture was done at 10:30 a. m., an interval of thirty-seven and a half hours having elapsed since the last injection. By advice of Dr. Meltzer, eight cubic centimeters of a 12.5 per cent solution of magnesium sulphate were injected. This injection was again followed by complete relaxation, the patient was drowsy and rested quietly, but was not stuporous. Five hours after the injection, the legs were paralyzed, but sensation was present. There was about the same rigidity of the jaw muscles. There was no pain unless he was moved. On this day the temperature fell to normal, but again rose, and continued between 100° and 101°. No rise of temperature followed this or the following injection. This injection held him well in hand until the next day, November 10, in the afternoon, when it again became necessary to give an injection. This was done at 3:30 p. m., twenty-nine hours having elapsed, and the 12.5 per cent solution was again used.

"Two hours later, the convulsions had disappeared, and he was resting quietly, without mental disturbance. As after the preceding injection, there was no loss of sensation in the legs, but they became paralyzed for several hours. On November 11, he was fairly comfortable; the convulsions were infrequent and slight. On November 12, the opisthotonos returned, but was not persistent, and on that day and the succeeding three days the symptoms were not severe, and he was kept comfortable with morphine and chloral.

On November 16, the sixteenth day of his disease, and the sixth day after the last injection of magnesium sulphate, the opisthotonos became more severe, and there was increased rigidity of the jaw muscles and considerable pain. Consequently it seemed wise to give him a fifth injection. The 12.5 per cent solution was used and was followed by marked relief. After that, although the convulsions returned, they were much less frequent and severe, and gradually disappeared, so that by December 1 he was practically well.

"During his illness the wound was dressed daily with weak iodine water. Rectal irrigations of several gallons were given twice daily, in order to increase elimination. Chloral and morphine were given in moderate doses when not under the effects of the magnesium sulphate.

"Five intraspinal injections were given without any injurious effect whatsoever. In fact, a certain amount of tolerance seemed to be established, for the later injections did not seem to have so much effect upon the sensory impulses and the cerebrum as the first, although the motor symptoms were practically the same after each injection.

"We are certainly justified in claiming the following points in its favor: 1. A marked effect in restraining the convulsions and relieving pain, thereby conserving strength and preventing excessive metabolism and heat production; 2. That the spasm of the muscles of mastication and deglutition is at least lessened, thereby permitting feeding; 3. That its action is continued for a considerable period (twenty-nine to thirty-seven hours) without depressing action upon the heart muscle; and finally, in one case at least, that repeated injections produced no harmful effect, except the inhibition of the bladder and the consequent need for catheterization."

In closing may I emphasize what the essayist has already said in regard to the treatment of tetanus, namely, that the best treatment for tetanus is prophylaxis, as so beautifully demonstrated by all nations in the last great war.

Lt. Col. Sherwood (by invitation): I have nothing that I can add to what has been said. We have the unusual experience in the Army of very rarely seeing a case of tetanus because, as said by Dr. Bulkley, we give the prophylactic dose promptly. I rather think Major O'Brien has a few figures he can give you with reference to our methods of prophylaxis.

Major Theo. W. O'Brien (by invitation): Mr. President, essayist and members of the Minneapolis Surgical Society, I have enjoyed the essayist's excellent presentation of his subject. I have been stationed at Fort Snelling, Minnesota, four and one-half years, during which time we have used the prophylactic dose of antitetanic serum whenever indicated in the treatment of wounds. We average thirty-five to fifty prophylactic injections a year in our small 100 bed Station Hospital.

During 1934, 2,360 patients were admitted to the hospital, one-half being surgical cases and one-fourth being eye, ear, nose and throat cases. Throughout the State, in the CCC Camps during 1934, there were 20,000 admissions to sick report. Based on our figures, probably one-half of them were surgical cases. The exact number of prophylactic antitetanic injections is not known at this time as the figures are compiled by the Surgeon General.

During 1933, there were 1,700 admissions to the Station Hospital with fifty prophylactice injections or an average of about one a week. Throughout the state, admissions to CCC sick report were 8,000. We have had no cases of tetanus, but we are heartily in favor of prophylactic treatment.

I have not seen a case of tetanus since the World War. However, this evening Colonel J. W. Sherwood told me of a case he had seen in San Antonio, Texas, during 1926, which developed within twenty-four hours following a compound fracture of a leg, sustained during a polo game. Even though an immediate debridement, reduction, and prophylactic antitetanic serum were used, crepitus developed within twenty-four hours and a pure culture of tetanus was obtained. However, with additional drainage, antitetanic and gas serum, the patient recovered.

Dr. J. F. Corbett: I was glad that Dr. Bulkley brought into the "lime-light" the question of the use of magnesium sulphate. This seems like a very important adjunct. Of course, it is not curative but it relieves the spasms.

It was my fortune to have to administer this form of therapy quite a large number of times during the years when tetanus was more prevalent than it is now. The procedure was first to get the patient under chloroform, that would give relaxation, and then we could do a spinal puncture, introducing the magnesium sulphate very readily. Without chloroform it was almost impossible to do it. The dose was 1 c.c. of 25 per cent solution for each 10 kilos of weight, and to repeat them as often as indicated. In one case where I used this adjunct the respirations became slow and I assumed it was due to the magnesium sulphate. I let the fluid out and the patient improved, so I assume it was the magnesium sulphate.

The statement was made that there was no case of localized tetanus in the records. I recall a case: a boy had received a cut in the face and five days after that developed tetanus. At the time I was a full time man at the University and I did not treat any cases. Dr. Sweetser treated that case, and he recovered, as the prognosis of cephalic tetanus is rather good.

The records of the British Commission are rather exhaustive. One thing struck me with a great deal of force: in no case of five day tetanus where the prophylactic dose had been used for twenty-four hours did it do any good. That is, it must be used within the next few hours following the injury or it does no good.

Dr. J. M. Hayes: During the war some of us were sent to Lyon, France, to visit the Clinic of General Berard. He had in the hospital at the time we were there, over thirty cases of tetanus. The French were grouping these cases at that time and perhaps that is one of the principal reasons why their mortality was lower than in other places, and especially since the war. Intraspinal injection of magnesium sulphate was their principal therapeutic measure for these cases. Not having seen this method before, we were not much impressed with it at the time, but later learned that he had a lower mortality than most centers of treatment for this condition. Others who were not so skilled in intraspinal therapeutics tried it but their results were not so good. It is a good illustration of the fact that one must be skilled in the intraspinal application of any drug in order to get the desired results. To get the best results with drugs of any kind intraspinally one must not only be able to get the drugs into the spinal canal with the least possible trauma and disturbance of surrounding tissue, but he must also know the contraindications and the untoward symptoms which may arise and be ready to treat them promptly and efficiently.

Dr. Willard Peterson: I can appreciate Dr. Merkert's paper the more because I know the time and effort he expended in its preparation. Rather than discuss so complete a paper I should like to report a case of tetanus which I treated and which recovered.

The case is that of a single white woman, age 38 years. Her family history was negative. In the past she had the usual childhood diseases. She had her appendix and tonsils removed about ten years ago. She also had been diagnosed and treated for ulcer of the stomach twelve years ago.

Her present history dates from two days before admission to the hospital. On that day she cut through the skin of the left hypothenar area on a printing or stamp pad. The first aid treatment consisted of merely bandaging. This cut remained tender and on the following day she noticed pain extending up to the elbow which caused her to apply hot packs to the hand and forearm up to the elbow. On the following morning, or forty-eight hours after the injury, she noticed the pain had extended into the left shoulder and left side of her neck.

I saw the patient first at noon on this same day, or about fifty hours after the injury. The findings at that time were definitely indicative of tetanus. The teeth were firmly clenched and could only be opened about one-half inch with difficulty, and only for a second before they closed again. The neck was rigid and any motion was very painful. The back was arched backward and there was bilateral carpo-pedal spasm.

The original site of injury was red and the edges everted, and there was considerable stiffness and pain in the entire left forearm and arm. The rest of the examination was negative. As the examination was completed she developed a convulsion similar to that seen in strychnine poisoning which lasted about thirty seconds, but she did not lose consciousness. About one hour later, as she was placed in the ambulance, she developed another similar convulsion.

When the patient arrived at the hospital the wound was cauterized and washed out with peroxide of hydrogen and she was given a small dose of antitetanus serum under the skin to test her sensitivity. As soon as it was definitely established that there was no reaction to the serum she was given 20,000 units of antitetanic serum intraspinally after removing the same volume of spinal fluid, and 10,000 units intravenously. Following this she complained of severe pain in her head, back and legs, and a sensation of tightness in her entire body.

At about 5:00 p. m., or two hours later, she became irrational and opisthotonos developed. The jaws became firmly set and a twitching of the fingers and toes developed. Morphine was given in ¼ grain doses which apparently caused some relaxation. The temperature was 101.2° and pulse 54.

The next day, October 14, 1932, she was semi-conscious all day. The pulse rate remained around 40 but of good quality. Her temperature did not exceed 99.8 rectally. She was very restless but the extreme extension of the feet, the rigidity of the jaws and neck remained constant. Under morphine the jaw would relax but any irritation around the mouth would cause instant closure. She was given 20,000 units of serum intravenously and 40,000 intraspinally. Later in the day she complained of inability to see and her hearing became diminished.

October 15. The severe pain in her head and back remained. The rigidity of her jaws was sufficiently less to enable her to ingest fluids. The head, however, remained in opisthotonos. She was given 40,000 units of serum intraspinally and 20,000 intravenously.

October 16. She was able now to open her mouth quite freely. She was again given 40,000 units intraspinally and 20,000 intravenously. The pulse rate increased to 60, and the temperature was 100 R. The vision and hearing improved slightly.

October 17. She was given 20,000 units of serum intravenously. The headache, backache, and opisthotonos remained but the head could be flexed onto the chest. The jaws could be opened. On this day she developed itching of the eyelids.

October 18. She was given 20,000 units of serum as the final dose. The mild itching of her body persisted. She was able, however, to move about in the bed without discomfort.

October 19. She developed urticaria of her hands and feet which caused a great deal of discomfort. A weakness of the right external rectus muscle developed and double vision left of the midline.

October 20. The urticaria became generalized, causing severe itching and discomfort.

October 21. The urticaria improved. Her temperature now was 98.2 by mouth, and the pulse around 90. She also had a slight chill followed by epigastric pain.

October 22. Food distress returned. The nervous symptoms had all disappeared with the exception of the eye signs and a numbness of the left hand.

October 23. Severe itching of the skin returned with edema of the eyelids and face. She also complained of a feeling of fullness in the throat.

October 24. Constantly improved.

October 29. Up in a chair.

October 31. Headache severe.

November 1. Condition satisfactory, to go home. Double vision still persists.

December 9. Vision normal.

Dr. E. T. Bell: I would like to raise the practical question here as to when the prophylactic antitoxin is to be given. It must be only a very small percentage of wounds that develop tetanus, and all of the speakers have called attention to cases where tetanus followed very trivial wounds, splinters in the fingers, etc. If we had been asked in advance whether or not to give prophylactic antitoxin to these patients we probably would have advised against it. Children are continuously getting splinters in their fingers and cutting their feet—are you going to give all of them antitoxin or not? Would you give the prophylactic injection to an asthmatic child?

Dr. Charles E. Merkert: I wish to thank all of the doctors who have discussed my paper, and I want to assure them that I appreciate their consideration of my presentation and the interest shown in the subject, as evidenced by the number who have participated in the discussion.

In regard to the magnesium sulphate injection treatment. as mentioned by Drs. Bulkley and Hayes, as stated in my paper, it was used in this series intramuscularly and intravenously. In two cases it was used intraspinally and both of these patients died. There is one thing about the use of magnesium sulphate injections that is well to remember and that is that the antidote, if an overdose is given, is calcium chloride given by injection.

In reference to Dr. Bell's question as to when to give prophylactic antitoxin or not, I wish to say that I consider that to be a very important question, but one regarding which there is a variance of ideas and opinions. Pertinent to this question, I wish to say that in one of the recent medical journals a case was reported where a doctor was legally held liable for damages because he had not administered antitoxin in a case where tetanus developed. Personally, in some injury cases I explain to the patient the possibilities, however slight, of tetanus developing and leave to him the responsibility as to whether or not he wishes the use of antitoxin. However, in puncture wounds. compound fractures, and deep lacerations of all kinds, I advise its routine use. On the other hand, I learned some time ago from Dr. Thomas Lowe, who is here tonight, that in connection with injuries in the packing plants at South St. Paul they rarely give antitoxin. and I believe they have had but one tetanus case in all their injuries in the past fifteen years.

In regard to anaphylactic reactions resulting from prophylactic injections, Bruce mentioned that in two million injections given to the British troops there were eleven such reactions, with recovery in all cases.

In conclusion, I wish to present the routine of treatment as recommended by Boyce and McFetridge in their recent paper:

I. Excision of local wound when possible; otherwise debridement or wide incision and drainage.

II. Use of serum.

  (a) On admission, after usual sensitivity test, 20,000 units by vein, 20,000 units intramuscularly; 2,000 to 5,000 units about the wound.

  (b) 20,000 units intramuscularly on the second and third days.

  (c) 10,000 units intramuscularly seven days later. (Maximum dosage never over 100,000 units; minimum dosage never under 50,000 units; important for economic reasons.)

III. Use of avertin via rectum for control of spasms —80 to 100 mg. per kilo initial dose; smaller continued doses used before previous doses wear off.

IV. Nourishment by stomach tube, infusions and other general measures as indicated.

THE RATIONALE OF THE INJECTION TREATMENT OF HERNIA

Carl O. Rice, M.D.

In order to place the injection treatment of hernia into the hands of the ethical members of the medical profession the efficaciousness of the method must be established upon sound scientific principles as well as on clinical results. It therefore becomes our problem to demonstrate, histologically, the tissue reaction which takes place after the injection of the irritating solution.

Peculiarly, this method of treating hernia was employed as long ago as 1835 by Valpeau, who used iodine to produce the irritation. A few years later Heaton (1843) reported the cure of hernia by the injection of a solution, the nature of which he did not disclose. He continued to report good results. In 1877 he published a book which disclosed the nature of the solution which he had been using. However, about that time Halstad was beginning to make his name on the work he had done in perfecting an operation for the cure of rupture. He demonstrated that this was a very rational and effective operation which was by far superior to the numerous ligation, cautery and other fanciful methods in vogue at that time. No scientific rationale had been developed to explain the cure by the injection method. Perhaps for that reason the method fell into disrepute. For the past fifty years it has received no mention in the literature. At no time has the method been investigated from a scientific point of view. No histologic or pathologic studies have been made to explain the cures and for that reason the ethical members of the medical profession have rightfully rejected it as part of their armamentarium. However, it does not seem that they are to be entirely forgiven for not having made histologic investigations whereby the method could have proven or disproven its worth.

It has been my pleasure to have had the opportunity of making this investigation from the histologic standpoint. Dr. Hamline Mattson has collaborated with me in this work. Further work is being carried out in an effort to find a solution which will possess all of the attributes and none of the undesirable features which we have established as essential to perfect results. Reference shall be made first to our initial work, which was done on the human. After that the investigative work which I have done in the experimental laboratory at the University shall be considered.

In the hernia clinic at the Minneapolis General Hospital we saw patients who were uncertain as to whether they desired an operation or the injection treatment. Likewise we saw others who, after having received one or two injections, decided that they preferred an operation. We therefore took this opportunity to obtain biopsies and in order to obtain the sequence of histologic changes we secured their admission into the hospital at intervals so that we have obtained sections from 15 hours to 42 days after the injection of the irritating solution.

No difficulty was encountered in the operation as a result of the previous injections. In a few instances

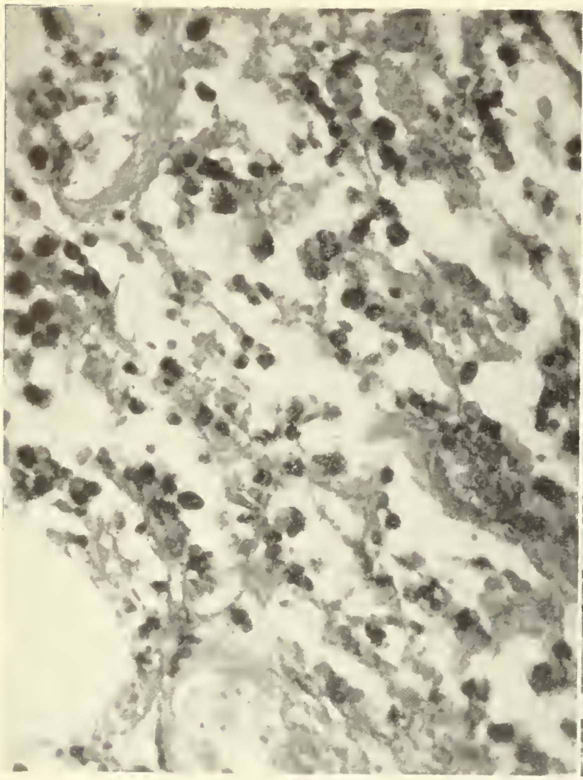


Fig. 1. Microphotograph from a section taken fifteen hours after the injection of the irritating solution. Polymorphonuclear cells, round cells and a few fixed connective cells. Magnification 800 X.

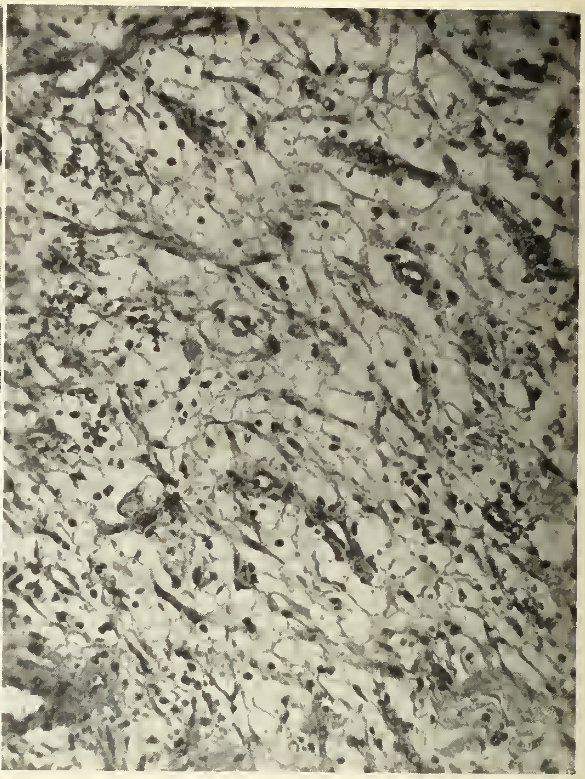


Fig. 2. Seven days after injection. Young fibroblasts and a few newly formed blood vessels predominate the picture. A few round cells, but only an occasional polymorphonuclear cell can be seen. Magnification 200 X.

where the patient had received three or four injections, the newly formed fibrous tissue made it somewhat more difficult to dissect the cord from the loose areolar tissue which surrounds it in the inguinal canal. In one instance in which the patient had had ten injections without having obtained a complete cure the scar tissue was similar to that which is observed at a second operation for hernia. This of course should not confound a surgeon. It has been mentioned, however, to indicate that strong, tough fibrous tissue is produced, for without the production of scar tissue it is very improbable that it would be possible to obtain a cure.

The histologic sections revealed the following findings:

At the end of fifteen hours the section showed an exudative reaction with polymorphonuclear cells and round cells. There was also some proliferation of the fixed connective tissue cells and some evidence of cellular necrosis (Fig. 1).

On the fifth day fibroblasts were seen with large dark staining nuclei. Polymorphonuclear cells were less evident but the round cells were still present.

On the eighth day the fibroblasts were more abundant and likewise appeared more mature. The intercellular fibers were beginning to make their appearance. Newly formed blood vessels were seen. An occasional polyblast was found (Fig. 2).

On the fourteenth day the fibrous tissue was found to lie in dense bundles. Fibroblasts seemed to have assumed more adult proportions. Their nuclei were smaller and the fibers more abundant. No polymorphonuclear cells could be found (Fig. 3).

On the eighteenth day most of the fibrous tissue appeared to be mature.

At the end of the forty-second day the tissue was dense and looked like adult fibrous tissue. The fibroblast nuclei were small and the fibers were abundant (Fig. 4).

Our initial work was done with phenol, alcohol and thuja as the irritants. This is evidently very caustic and cannot be given in more than four or five minim doses, without producing definite tissue necrosis. Theoretically this exudative and destructive phase of the inflammation could produce an abscess. It therefore seems desirable to use a solution which would produce less of the exudative reaction and still stimulate the production of fibrous tissue.

The ideal solution should be one which causes no pain when injected; it should be non-injurious to the tissues; it should produce no systemic reaction from its absorption; it should be non-toxic if inadvertently injected intravenously; produce no peritoneal inflammation if likewise injected in the peritoneal cavity and should produce a predominance of the proliferative phase of the inflammation with a minimum of the

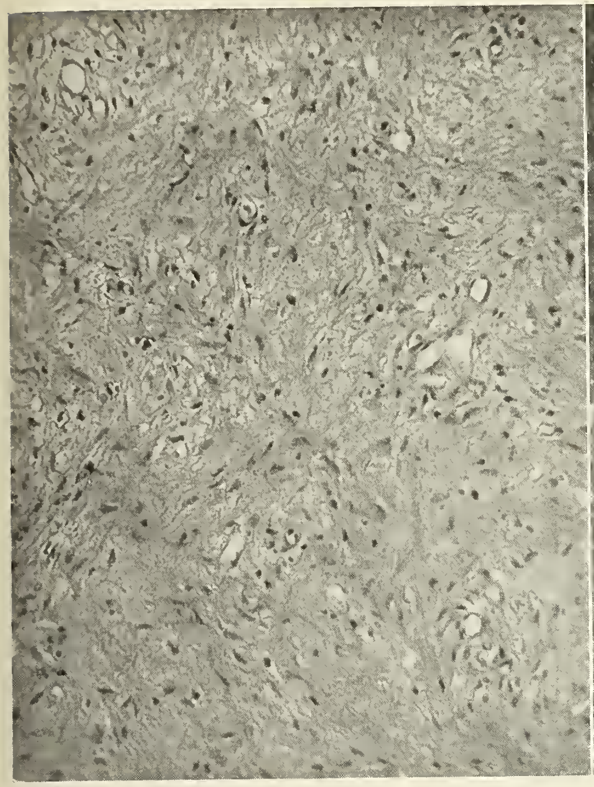


Fig. 3. Fourteen days after injection. Young fibrous tissue with small, slender nuclei can be seen. Fibers are moderately abundant. An occasional round cell, but no polymorphonuclear cells can be seen. Magnification 200 X.

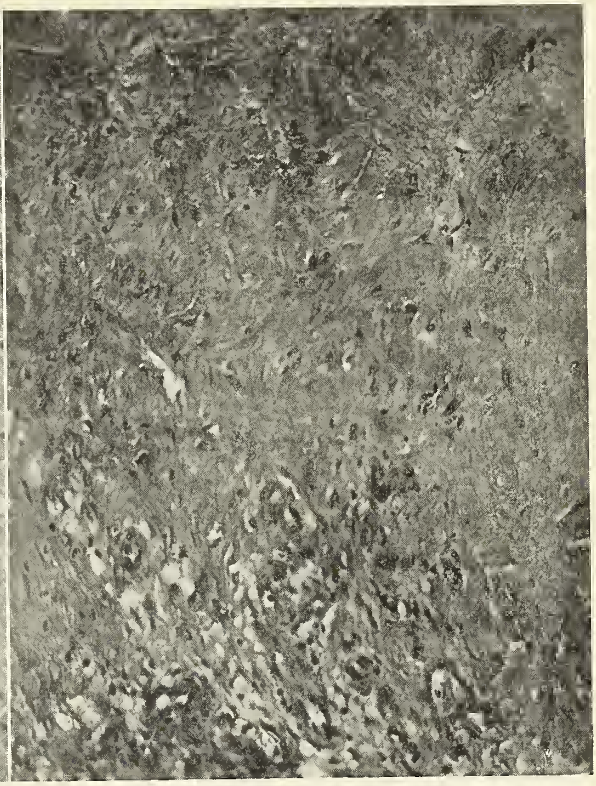


Fig. 4. Forty-two days after injection. Fibrous tissue is abundant. Fibers are wavy. At the right of the section the proliferation of fibrous tissue does not appear to have progressed as far as at the left side of the picture.

exudative phase. It should stimulate the production of fibroblasts whereby the defect can be filled with scar tissue.

In the experimental laboratory at the University I have injected a number of solutions into the rectus muscle of the dog in an effort to determine the comparative amounts of exudative reaction and the comparative amounts of fibroblastic stimulation.*

Those solutions containing phenol, tannic acid and other mineral acids produce the inflammatory reaction and eventuate in the production of scar tissue but they also cause tissue necrosis and an exudative reaction greater than that which seems necessary or desirable. The rationale of producing scar tissue by such a method, though effective, is not entirely sound.

A solution containing tannic acid, alcohol and a few other ingredients was injected intravenously into the dog. Immediately after the injection the dog staggered about on the floor for a few minutes and appeared sick. He recovered completely within fifteen minutes. Intraperitoneal injection produced pain. Twenty four hours later the small capillaries of the peritoneum appeared congested. There was a slight increase of the intraperitoneal fluid but no fibrinous exudate.

Sodium psylliate,* a soap, is a mild sodium salt of a fatty acid and seems to possess most of the desirable features. It produces the minimum amount of exudative reaction after its injection; it is practically painless when injected; it stimulates the growth of fibrous tissue; it produces no systemic reaction when injected as was so often observed after the injection of other solutions which contained tannic acid, alcohol or phenol. This solution was injected into the blood stream of the dog and no reaction was observed. After injecting it intraperitoneally in the dog it appeared that the animal experienced pain but within ten minutes his reaction seemed normal. Twenty-four hours later the peritoneal cavity was opened and no evidence of peritoneal inflammation could be found. This solution is somewhat similar to sodium ricinoleate and we know that that has been used in the peritoneal cavity of the human without harmful effects. Likewise sodium ricinoleate and sodium morrhuate have been injected intravenously in the treatment of varicose veins without harmful effects. The exudative reaction of these solutions when injected into the tissues may eventuate in an abscess.

In order to convey the idea that this method of treating hernia has now passed the experimental stage it might be well to state that it has been used at the

---

*This work has now been discontinued in favor of Dr. Arthur A. Nelson, who is working on this problem for a Master's Thesis in Pathology.

*Sylasol (G. D. Searle and Co.)

Minneapolis General Hospital for two and three-fourths years and at the University Hospital for about three and one-half years. At the Minneapolis General Hospital we have treated more than 600 cases.

A follow-up letter has been sent to 400 patients but the responses have been proving very unsatisfactory. Perhaps that is to be expected with this type of transient charity case. However, in those cases which we have been able to check at quarterly intervals we have found very few recurrences and I know of only two cases which we have referred into the hospital because we felt incapable of producing a cure by the injection method.

We have had two cases of chemical peritonitis. This followed the injection of a solution of quercus alba. This solution is not recommended for the treatment because of its severe and caustic reaction. We have also observed a number of cases of induration of the cord but this condition has subsided without complications. It was produced after the injection of different ones of the more caustic solutions. This condition has not been observed in a single instance in which sylasol has been used.

I have heard of other complications such as peritonitis, cellulitis, perirectal abscesses and thrombosis of the inferior epigastric artery with gangrene of the skin. Dr. Lawrence Larson and I are making an investigation of these cases but it is my opinion that these complications have developed not as a fault of the method but as a fault of the technic.

Conclusions

From this bit of investigative work it seems that the rationale of the injection treatment for hernia can be established upon sound scientific principles. The production of fibrous tissue at the site of the defect is the mechanism by which the hernia is cured but the production of scar tissue through the destruction of normal tissue as may occur after the injection of strong caustic solutions, although effective, does not seem to be the final word in the choice of a satisfactory solution.

A solution of a mild soap (sylasol) seems to have fulfilled the requirements to greatest advantage. Clinically it has proven to be effective and histologically the sections reveal the minimum amount of exudative reaction and tissue necrosis with a predominance of the proliferative phase.

In view of these findings it is recommended that, in suitable cases, the injection treatment of hernia be added to our surgical armamentarium where surgery is contraindicated and in those individuals who prefer not to have an operation for the cure of their rupture.

Bibliography

1. Valpeau, M.: The Anatomy and Surgical Treatment of Hernia. D. Appleton and Company, page 272, 1892.
2. Heaton, George: New treatment of hernia. Boston Med. and Surg. Jour., 27:421-422, 1843.
3. Heaton, George: The Cure of Rupture. Houghton and Company, Boston, 1877.

Discussion

Dr. A. F. Bratrud: I have listened to Dr. Rice's presentation on this subject with a great deal of interest and am sure that everybody has the same feeling.

Drs. Fraser and Hall in 1929 did some experimental work using the original pina mestre solution, at the New York University and Bellevue Hospital. Their work was carried out principally on monkeys and dogs. Their results showed edema and swelling in about ten days. Examination of the indurated areas showed a vigorous proliferation of endothelial and connective tissue cells, plus large mononuclear phagocytes and foreign body giant cells. They did not feel that there was any danger of these areas forming any malignant neoplasm later on.

A great number of dogs and rabbits were injected at the University, using various types of solution. The thuja mixture produced the greatest amount of proliferation. Various mixtures with tannic acid from 1 per cent up to 5 per cent were used. These produced a very active proliferation of fibroblastic tissues, with no necrosis. When these solutions were tried on patients they had to be combined with local anesthetics, so as to diminish the burning sensation which resulted. For this, nupercain and novocain were used.

When a synthetic tannin preparation was used on patients, a number would complain of symptoms resembling an acute coryza on the following day. This was taken up with a pharmaceutical chemist, who gave the opinion that this resulted from the fact that there was more rapid absorption from synthetic preparations than when tannin existed in colloidal form. Pina mestre solution was used, both the original mixtures and a preparation put out by a drug firm in this country. Necrosis resulted in tissue injected with the preparation which was put up in this country, according to the pina mestre formula. A distillate of vegetable tinctures supposedly contained in the pina mestre solution was used, and this produced practically identical tissue reaction as the original pina mestre solution. This shows a fibroblastic proliferation with a few foreign body giant cells.

A preparation of oleic acid put up by Searle and Company was used and this appeared as though it would be good, but after about eight weeks it was impossible to find the area in which the solution had been injected. Various strengths of fluid extract of pinus canadensis, varying from 1 to 10 per cent, were used. These produced a very active proliferation immediately. Fibroblastic tissue appeared as early as the fourth day. However, there was necrosis, abscess, peritonitis and death in two dogs, so this was discarded. The fluid extract of pinus canadensis is one of the active ingredients in Mayer's solution.

There is one thing that has impressed me rather forcibly in the treatment of patients with any solution. All patients do not have the same rate of proliferation or absorption, after treatment. Occasionally in cases treated it seems as though the fibroblastic tissue simply disappears. It seems to be almost completely absorbed. It would be extremely interesting to have sections of these areas to see what actually has happened. This is a condition that is very often seen after hernias are operated upon. Suddenly the fascia begins to absorb and the hernia breaks out larger than the original, in the course of a few weeks.

We do not yet know what solution will be the best for this method of treatment. At the present time we have had the best results with proliferol, which is a distillate of vegetable tinctures. I believe it is a good plan to use a few injections of the thuja mixture with the proliferol solution, as it appears to give better and quicker results than when either is used alone. The best solution is going to be the one which will produce the most active proliferation of fibroblastic tissues with the least reaction, and which is the least dangerous.

There is no question but that great harm may result from improper use of any solution, and particularly so with the thuja mixture. I am greatly interested in the report which Dr. Rice has given on sylasol, and shall certainly try some of it and compare results with the proliferol solution.

Dr. E. T. Bell: I have been very much impressed with the good results of this treatment. Dr. McKinney and Dr. Bratrud have secured an excellent result on two janitors in the Anatomy Building who had very large herniæ. The great advantage of the treatment is that tissue is formed where there was none before. You do not destroy any tissue but form scar tissue where it is needed to close the opening. It is sound from the pathological point of view. I do not understand the prejudice most of the surgeons have against the injection treatment; possibly they think that injection is a chiropractic treatment. There is no reason why this excellent non-surgical treament should be allowed to fall into the hands of irregulars.

Dr. J. M. Hayes: I have been on service at the out-patient department at the University on alternate days with Drs. Bratrud and McKinney and have injected some herniæ almost from the beginning of their work. I have not become as enthusiastic over this work as they have, although I do not doubt that they are justified in their enthusiasm. For the patient who cannot afford to pay a hosnital bill, I am sure it is the treatment of choice for this condition. In private practice the patient who is able to pay a hospital bill frequently chooses to go in and have it over with rather than have the injections while he is carrying on with his work. Frequently the patient will forget to come back when the hernia ceases to come out but the opening is not sufficiently closed to prevent recurrence. I am pleased to see these men continue with this experimental work and aim to get a solution which will give maximum results with minimum chances of harmful sequelæ.

Dr. Herbert Carlson (by invitation): I would like to ask Dr. Rice or Dr. Bell if they have any slides to show later development of this scar tissue. I have some slides to show in empyema that scar tissue replacing the pleura later becomes more delicate. That change might be an important factor in the recurrence of hernia.

Dr. J. F. Corbett: I would like to ask Dr. Rice a question as to the contraindications of the injection treatment?

Dr. Theo. Sweetser: Do you consider it rational to add one or more injections a few weeks after operation for hernia in cases wherein the tissue has been so attenuated as to make the strength of the repair doubtful?

Dr. Carl O. Rice: In regard to Dr. Carlson's remarks, I have no information but I do not believe that the strong scar tissue which is seen in the histologic sections presented here would have a tendency to be subsequently absorbed.

Dr. Corbett asked what the contraindications were for the injection treatment of hernia. Any hernia which cannot be reduced or cannot be maintained with a truss cannot be treated by the injection treatment. A patient with a carcinoma, ascites, an undescended testicle or urinary retention, or its associated symptoms, should not be treated by this method.

We have treated a number of postoperative herniæ by this method and have obtained very good results but I do not believe that the addition of some of this irritating solution into the field of operation would add much to the curative results if the operation was not properly performed.

TUMORS SIMULATING CARCINOMA—SCHÜLLER-CHRISTIAN'S DISEASE OR XANTHOMATOSIS

W. A. Hanson, M.D., and L. H. Fowler, M.D.

The syndrome was reviewed and the following case was presented with lantern slides.

The patient was a female aged 50, who was referred to us by Dr. Norman Johnson, August, 1926, for the removal of a tumor of the right pectoralis region at the border of the upper quadrant of the breast, with the following complaints:

1. Insomnia and diplopia, at times associated with dizziness for the past six weeks.
2. Generalized headaches of intermittent character with "a whistling sensation" in the ears for the previous two months.
3. Pain of dull character over the precordium at intervals, not related to exercise and of variable duration.
4. Low backache with difficulty in stooping and standing. The complaint had been present as a child and gradually increased in recent years. Turning in bed was difficult and at times she was uncomfortable in bed. Fatigue would aggravate her backache so that at times she was unable to stand erect.
5. A peculiar hurting in the top of the head when stooping or leaning over; a sensation "like loose bodies in the head."

Family history.—Her mother and two maternal aunts had died from carcinoma of the uterus.

Past history.—Sleeping sickness as child and scarlet fever without complications at the age of eight years. Also as a child she had influenza complicated by peritonitis. A hysterectomy and appendectomy had been performed in 1919 and a hemorroidectomy in 1920.

Menstrual history.—The menses had started at the age of eleven years, and had always been regular, but excessive until cessation in 1919.

Physical examination.—The temperature was 98.6°, pulse 84 per minute. Her weight was 185 pounds and her height 5 feet 8 inches. The blood pressure registered 165 systolic and 110 diastolic in millimeters of mercury. The essential positive findings were: a dry scaly skin and enlarged tonsils. The abdomen was slightly tender in the right subcostal area, but no masses were made out. A small rather firm movable mass 1 x 1.5 inches in diameter was found at the border of the upper outer quadrant of the right breast in the pectoralis area. External hemorrhoids were present. The pelvic examination showed the cervix of normal size, soft and smooth. The motion of the spine appeared within normal limits with tenderness on palpation over the right sacroiliac joint.

Laboratory findings.—Repeated urine examinations were negative. The blood showed a hemoglobin of 75 per cent, r.b.c. 5,248,000 and the w.b.c. 9,300 and 8,000 per cubic millimeter with a normal differential.

X-rays of the skull and lumbar spine were made. These showed a destruction of the intervertebral disc between the forth and fifth lumbar space. The left sacroiliac joint showed a marked increased density with numerous striations in the crest of the ilium which had the appearance of an osteoblastic carcinoma, probably from the breast. The skull showed areas of metastatic carcinoma.

Diagnosis.—Metastatic osteoblastic carcinoma of the fifth lumbar body and fourth disc, the left ilium and skull; or a possible Paget's disease.

Operation—Was performed August 12, 1936. The nodule at the border of the right breast was excised under general anesthesia without difficulty or incident. The tumor measured 1.5 x 2 cm., and was rather firm, uniform and encapsulated. Grossly on section this had the appearance of a lymph-node.

The pathological report was: metastatic carcinoma (Grade IV malignancy), cells of very embryonic character.

Follow-up record.—The patient's relatives were informed she had a carcinoma, although the sections did not impress us as a malignancy. She was also advised to have x-ray treatments to the skull and pelvis, which was not followed out.

August 8, 1930. There has been apparently no appreciable change since the previous examination except for a tenderness in the left jaw. An x-ray of the lumbar spine and pelvis showed the process to extend to the acetabulum while the skull showed the process diminished but still present.

May 23, 1932. She had gained eight pounds in weight. Pulse was 100 per minute and the blood pressure registered 180/110. The right pupil was larger than the left. There was also slight tenderness over the right sacroiliac joint area. She stated there had been pains over this area which radiated to the anterior lower quadrants of the abdomen and was aggravated by increased activity. At this time she informed us she had been running an unexplained fever for some time. X-rays of the pelvis and spine showed no change other than noted on the examination of August, 1930.

November 17, 1933. She stated she was comfortable only when lying on the right side during her attacks of pain. Since her attack of sleeping sickness she had had severe headaches, dizziness and occasional temperatures as high as 103°, as well as movements of her visual fields at times. The examination revealed no appreciable changes since the last checkup.

July 12, 1934. She reported her condition was about the same as previously and the laboratory reported her blood cholesterin as 147 milligrams per 100 c.c. and the skull, lumbar spine and pelvis with no apparent change.

Inasmuch as the clinical picture, x-ray and laboratory findings did not seem to warrant the diagnosis of malignancy a review of the sections of the tumor was requested of Dr. E. T. Bell of the Pathology Department of the University of Minnesota, who reported it to be that of xanthomatosis or Schüller-Christian's disease.

Summary

1. A case of xanthomatosis or Schüller-Christian's disease is reported and emphasizes the importance of reviewing microscopic sections previously obtained.

2. This is a rare disease, there being less than 60 cases reported in the literature, the exact etiology being unknown.

3. The disease progressed very little from the time she was first seen nine years ago, regardless of her not following instructions to have x-ray treatment of the skull and pelvis.

4. The whole picture is of a rather bizarre nature with typical skull findings, no diabetes insipidus or exophthalmos, but with lymph-node involvement, upon which the diagnosis was made. Relatively few cases have been reported with these findings.

5. The prognosis is better than that of carcinoma, the mortality being about 30 per cent, and the best results have been obtained by x-ray treatment of the involved areas.

6. We wish to acknowledge our appreciation for the coöperation of Dr. Norman Johnson, who referred the case, and Dr. E. T. Bell, who established the diagnosis of the exact pathological condition.

Discussion

Dr. E. T. Bell: This case looks easy but it wasn't easy nine years ago when I first saw it. My first contact with this case was in 1926, when I examined an axillary lymph node which was sent to me by Drs. Fowler and Hanson. I diagnosed it a metastatic carcinoma, probably hypernephroma. In 1926 we knew nothing about Schüller-Christian's disease. As you will note, the lantern slides (slides shown) the resemblance to metastatic hypernephroma is close. The tissue was not stained for cholesterol, and only a paraffin block has been preserved.

I seem never to have satisfied Drs. Hanson and Fowler. Several years later they complained about the diagnosis, saying that the patient was well.

In 1934, eight years later, I reëxamined the slide and recognized it as Schüller-Christian's disease. The changes in the bones are also convincing evidence that this diagnosis is correct. We learn from our mistakes, which are often revealed by follow-up studies.

I have not seen any reports of lesions in lymph-nodes. Some of the cases are severe, but others run a mild clinical course, such as the patient under discussion. X-ray treatment of the involved area is sometimes quite successful.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for September

The Minnesota State Medical Association Morning Health Service

The Minnesota State Medical Association broadcasts weekly at 11:15 a. m. every Tuesday over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month will be as follows:

September 3—Foreign bodies in the eye.
September 10—Prenatal care.
September 17—Ticks and disease.
September 24—Women in cancer education.

Inter-State Postgraduate Medical Association of North America

The International Assembly of the Inter-State Postgraduate Medical Association of North America will be held in the beautiful Masonic Temple, Detroit, Michigan, October 14, 15, 16, 17 and 18, 1935, with pre-assembly clinics on Saturday, October 12, and post-assembly clinics Saturday, October 19, in the Detroit Hospitals.

The Association through its officers and members of the program committee extends a very cordial invitation to all physicians in good standing in their State and Provincial Medical Societies to attend the Assembly. An unusual clinical and didactic program including all branches of medicine and surgery and the specialties has been arranged by the program committee.

In coöperation with the Wayne County Medical Society and the Michigan State Medical Society and with the active support of the Detroit Convention and Tourist Bureau and the Detroit Board of Commerce, a most excellent opportunity for an intensive week of postgraduate medical instruction is offered by a very large group of acknowledged leaders in the profession.

With a great deal of pride and satisfaction, we call your attention to the list of distinguished teachers and clinicians who will take part on the program, which appears on page xxvi of the advertising section of this journal.

Registration fee of $5.00 admits all members of the profession in good standing.

Dr. Charles H. Mayo, President, Rochester, Minn.

Dr. George Crile, Chairman Program Committee, Cleveland, Ohio.

Dr. William B. Peck, Managing-Director, Freeport, Ill.

Seventh Annual Training Course for Medical Reservists at the Mayo Clinic

The two weeks' period, October 6 to 20, 1935, has been selected for the Seventh Annual Training Course for Medical Department Reservists of the United States Army and Navy, at the Mayo Clinic, Rochester, Minnesota.

These training courses at the Mayo Clinic were inaugurated by the Seventh Corps Area to give military training to the young Medical Corps Reserve Officers on the staff of that institution, who could not attend summer camps. It developed that Reservists not connected with the Clinic desired to attend. It was noted that, inasmuch as the military work was given in the afternoon and evening hours, these men were able to attend the strictly professional presentations by the staff of the Mayo Clinic during the morning hours. In recent years, special professional presentations have been arranged as a regular part of the course.

The program will follow the plan which has been so successful in past years. The morning hours will be devoted entirely to professional work in special clinics and study groups. Officers in attendance may select the course they wish to follow from the wide variety of presentations offered. The afternoons and evenings will be devoted to Medico-Military subjects.

The Staff and Faculty of the Mayo Clinic will present the professional training, while the Medico-Military Program will be under the direction of the Surgeon of the Seventh Corps Area (Army) and the Surgeon of the Ninth Naval District (Navy).

Enrollment is open to all Army and Navy Reservists of Medical Departments, in good standing. Applications should be submitted to the Surgeon, Seventh Corps Area, Omaha, Nebraska, or the Surgeon, Ninth Naval District, Great Lakes, Illinois—Enrollment is limited to two hundred.

The Surgeon Generals of the Army, the Navy and the Public Health Service, have all signified their desire and intention of being present during at least a portion of the course.

Mississippi Valley Medical Society

The first annual meeting of the newly formed Mississippi Valley Medical Society will be held at Quincy, Ill., October 2, 3, 4. The meeting and commercial exhibit will be held in the new and thoroughly modern Lincoln-Douglas Hotel. There will be morning, afternoon and evening sessions of a most practical character. The entire program is arranged to appeal especially to the general practitioner.

Among the eminent clinicians on the program are:

Isaac A. Abt, M.D., Prof. of Pediatrics, Northwestern University School of Medicine.

Fred H. Albee, M.D., Prof. of Orthopedic Surgery, New York Post-Graduate Medical School and Hospital.

W. Wayne Babcock, M.D., Prof. of Surgery, Temple University School of Medicine.

Hugh Cabot, M.D., Prof. of Surgery, University of Minnesota Graduate School of Medicine.

Arthur C. Ernstene, M.D., Cardiologist, Cleveland Clinic.

Frederick A. Figi, M.D., Assoc. Prof. of Laryngology, University of Minnesota Graduate School of Medicine.

Thomas E. Jones, M.D., Gynecologist, Cleveland Clinic.

Wm. C. MacCarty, M.D., Prof. of Pathology, University of Minnesota Graduate School of Medicine.

Albert Soiland, M.D., Chairman, Malignancy Board, California Hospital of Los Angeles.

These men will each give two or three practical lectures or clinical demonstrations and will be assisted by twenty-seven specialists from Illinois, Missouri and Iowa who will conduct a clinical lecture course. There will be a total of over fifty lectures and demonstrations during the three day session. All ethical physicians are cordially invited to attend the meeting. A detailed program may be obtained from Harold Swanberg, M.D., Secretary-Treasurer, 211-224 W. C. U. Bldg., Quincy, Illinois.

"Contacts"

Hennepin County Tuberculosis Association

Emphasizing the rôle of the family physician in dealing with the problem of tuberculosis in an average American home, "Contacts," the new motion picture produced by the Hennepin County Tuberculosis Association and the Department of Visual Education at the University of Minnesota, is now available for use throughout Minnesota.

The picture shows the physician dealing with a case of miliary tuberculosis in a child. Subsequently, he goes into action to trace the infection back to its source. Both in caring for the family during the time of the illness and in protecting other members of the family and the community from further infection, he has the stellar part in the tragic little drama.

"Contacts," which is now being requested for nationwide use, has the distinction of being the first health picture ever made with sound and music. Incidentally, it is the first new film in the tuberculosis cause in three years.

Favorable comments which have recently been received from members of the medical profession and public health leaders are especially enthusiastic about the appeal the film has for audiences of every type, children as well as adults, both lay and professional groups, and the fact that its simple, human story is equally applicable anywhere. Its lesson is of the widest application and is readily understood. Many have emphasized the thoroughness with which the picture covers the facts on tuberculosis prevention which the layman needs for self protection, making it a most valuable medium of health education.

The film has recently been revised and extended and now includes a dramatic sequence, "Modern Weapons for the Control of Tuberculosis," which reviews in a striking and effective parade such factors as the tuberculin skin test, the x-ray, the methods of resting the lung, sanatorium treatment, et cetera.

Arrangements for showing the film may be made through the Hennepin County Tuberculosis Association or the Minnesota Public Health Association. Physicians who wish to have the picture shown before any groups with which they are affiliated may arrange for it by calling or writing to either of the above organizations.

Biological Photographic Association

The fifth convention of the Biological Photographic Association, including those interested in medical illustrations in general, will be held at the Stevens Hotel, Chicago, September 12, 13 and 14, 1935. Registration will begin at 8:30 A. M., September 12.

The two and one-half days program includes lantern slide projections, intragastric photography, ocular photography, microcinematography and scientific moving pictures. The banquet is scheduled for September 13.

Ralph P. Creer, Hines, Illinois, is chairman of the program committee.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

ELECTROTHERAPY AND LIGHT THERAPY. Richard Kovacs, M.D., Clinical Professor and Director of Physical Therapy, Polyclinic Medical School and Hospital, New York. 696 pages. Illus. Price $7.50. Philadelphia: Lea and Febiger, 1935.

This second edition of Kovacs' book is an excellent reference manual for anyone who is interested in gaining an understanding of the principles underlying physical therapy. Each subject is preceded by an excellent and concise presentation of the elementary physics underlying it. This is followed by a description of the modality, its production, physics, physiology, technic of application, indications, and contra-indications. The final section, consisting of eleven chapters, is devoted to applied electrotherapy and light therapy, and discusses by diseases the physical measures used in their treatment.

Dr. Kovacs is a well known and highly regarded electrotherapist, and apparently has tried to present in this work only treatments for which there is a definite scientific basis or which have been proved effective by extensive clinical use. I believe the book can be recommended as one of the outstanding works on this subject.

Miland E. Knapp, M.D.

ILLUSTRATIVE ELECTROCARDIOGRAPHY. Joseph H. Bainton, M.D., Attending Physician and Chief of Cardiac Clinic, Morrisania Hospital, New York, and Julius Burstein, M.D., Associate Electrocardiographer, Morrisania Hospital. 258 pages. Illus. Price, $5.00. New York: D. Appleton-Century Co., 1935.

As its name implies, this book is a collection of electrocardiograms tending to illustrate the different forms of pathology which it is possible to demonstrate by this means.

The subject matter is divided into fifteen groups, starting with normal electrocardiograms and then showing tracings grouped according to different forms of heart pathology. Throughout the book each plate is well explained by a suitable paragraph or two. The book is quite up to date and makes an excellent reference work with the possible exception that information from four lead tracings tending to diagnose the location of a coronary occlusion is not given.

The book is very worthwhile for anyone who is attempting to familiarize himself with the reading of electrocardiograms.

M. A. Shillington, M.D.

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society.

Volume 18 October, 1935 Number 10

CRITERIA OF OPERABILITY FOR GOITER*

EMIL GOETSCH, M.D.

Brooklyn, New York

THYROIDECTOMY in experienced hands has become one of the safest of surgical procedures. There is, however, a small percentage of mortality following operations on the thyroid gland which it seems difficult to avoid. In a comparison of the fatalities occurring during the ten year period from 1920 to 1929, inclusive, with those occurring in the recent five year period from 1930 to 1934, inclusive, it was found that mortality following thyroid operations had improved in certain respects but there still remained a definite percentage of fatalities occurring as a result of postoperative hyperthyroidism and crisis.

During the fifteen year period mentioned, there were 3,610 operations on 3,321 patients with forty-two fatalities—an operative mortality of 1.16 per cent and a patient mortality of 1.26 per cent. Of the forty-two fatalities, seventeen, or 40 per cent, were due to postoperative crisis with secondary cardiac failure, and seven, or 17 per cent, of the total fatalities were due to primary cardiac failure unassociated with severe postoperative crisis. It is seen then that 57 per cent of all fatalities were due to these two causes. The next two important causes of death were pneumonia and embolism, each of which was responsible for 10 per cent of the fatalities. The remaining seven fatalities were assigned to seven different causes, each of which was thus responsible for only 2 per cent of the fatalities. It is instructive to review the elements of risk or the criteria of operability which have become apparent from a study of the fatal cases occurring in the experience of Dr. Emil Goetsch and Dr. Arthur Goetsch at the Long Island College Hospital, Brooklyn, in the past fifteen years.

Postoperative Hyperthyroidism

In the last five-year period, 60 per cent of the fatalities were due to postoperative hyperthyroidism and 54 per cent of the fatalities during the first ten year period were due to this cause. In a review of the history and physical examination of the seventeen patients who died in crisis, it seemed that the following factors were definitely contributory to the postoperative hyperthyroidism and were thus of bad prognostic omen: great loss of weight (thirty to fifty pounds or more) and an associated marked asthenia; unusually severe, uncontrollable hyperthyroidism; the unfavorable influence of the indiscriminate use of iodine in the previous treatment of the patient; cardiac damage; unusual nervous and mental symptoms; prolonged pressure, particularly in the adenomatous cases. There was a mortality of 0.68 per cent in the exophthalmic goiter patients and of 0.33 per cent in the adenomatous goiter patients due to crisis. There were thus twice as many deaths in the former group as in the latter. Some of the reasons for this are subsequently considered. It was found that the type of operative procedure was by no means the sole determining factor in the fatal outcome since various types of procedures such as preliminary ligation, hemithyroidectomy with and without preliminary ligation, and double resections were all employed in these fatal cases. A very disturbing factor was found to be the indiscriminate treatment with iodine, which had in the great majority of instances produced an exacerbation of the preëxisting hyperthyroidism. This in turn directly contributed to the postoperative hyperthyroidism. Thus of the seventeen deaths occurring as a result of postoperative hyperthyroidism, there were only two in which iodine had not been indiscriminately administered previous to operation.

---

*Summary of the annual guest address before the Minneapolis Surgical Society, February 7, 1935.

The generally prevalent medical treatment of the hyperthyroid patient with iodine commonly converts the relatively inactive case into an active one and the active case into a critical one and thus renders the operative procedure increasingly dangerous. The factor of greatest security and comfort in the approaching thyroidectomy seems definitely to be the degree of clinical remission obtained after the correct preoperative treatment with iodine as advised by Plummer. The greatest single cause for the failure to obtain a satisfactory remission is the previous iodine therapy. The thyroid gland often becomes saturated with iodine, undergoes a secondary activation resulting in a relapse and in this period is refractive to the further administration of iodine even in large doses. This holds true whether the case is one of exophthalmic or adenomatous goiter. The patient who has been indiscriminately iodinized becomes a more serious risk after thyroidectomy. Furthermore, the metabolic rate in such cases may not be unusually high and may thus fail to act as a warning to the surgeon. The further intensive treatment with iodine does not protect the patient in any way comparable to the protection afforded by its administration the first time. With abundant evidence at hand, it seems safe to advise against all treatment with iodine in patients with hyperthyroidism. It does not cure and it deprives the surgeon of one of his most reliable factors of safety, namely the preoperative clinical remission otherwise obtainable by the first and efficient intensive treatment with iodine.

Primary Cardiac Failure

Seven of the forty-two fatalities were due to primary cardiac failure unassociated with severe postoperative hyperthyroidism. Four were in instances of exophthalmic and three of adenomatous goiter. These fatalities were referable solely to the utterly bad condition of the patient generally and of the cardio-circulatory system in particular. In several of these patients we were dealing with the terminal or "burnt out" stage of hyperthyroidism. Thyroid overactivity per se was thus not an important factor in the preoperative status of these patients. The symptoms and signs of cardiac enlargement and of myocardial degeneration were present in varying degrees in more than half of the cases. Again, the type of operation, whether a resection or a preliminary ligation, was not of primary importance. The majority of the patients died of progressive cardiac disability and the operation was simply an incident in the fatal course of the disease. In summary we may say that when the criteria of operability concern a heart too badly damaged for any recuperation and when there is no longer any real element of hyperthyroidism, it is futile to operate. The outlook is bad whether the patient is treated medically or surgically.

Pneumonia

Of the forty-two fatalities, there were five, or 12 per cent, resulting from pneumonia, two of the lobar and three of the bronchial type. The criteria of bad prognosis here were the generally bad physical condition and the factor of previous injury and infection of the respiratory system. It was found invariably that in all five patients who died of pneumonia there had been a history of more or less serious cardio-pulmonary complications together with other systemic disorders and marked exhaustion. The generally satisfactory postoperative results are largely attributable to deferring operation whenever there is a history of recent respiratory infection, to the use of a light gas-oxygen or ethylene anesthesia which assures early recovery of the throat reflexes and thus avoids aspiration, and to avoiding unnecessarily prolonged operation, trauma and injury to the recurrent laryngeal nerves with consequent respiratory embarrassment.

Embolism

There were five patients, from twenty-seven to fifty-five years of age, who died of post-operative embolism. Four were in instances of exophthalmic and one of adenomatous goiter. The principal findings in general were myocardial damage with cardiac enlargement, arrhythmia and decompensation, marked arteriosclerosis, aortitis and hypertension. One patient suffered from an old endocarditic process exhibiting precordial thrill and a systolic murmur. The extent of the operation played no direct role in the fatal outcome in the five instances mentioned.

Tetany

There was one death due to tetany which could have been avoided by a more adequate treatment with parathormone and calcium. The patient was planning to go home when on the eleventh postoperative day she went into a series of severe convulsions and before parathormone and calcium could be made effective, she died. This was doubtless a case of injury to the parathyroids and their circulation and sufficient time had not elapsed for these glands to regain their circulation. In the meantime proper therapy had been interrupted while the patient was still on the threshold of more severe spasms in which she finally promptly died.

The remaining seven fatalities were mostly of accidental character, occurring in the earlier years and avoidable to a great extent at the present time as a result of better technical procedures and greater experience.

Thus there were two deaths two days and six hours respectively after operation due to respiratory failure secondary to severe laryngeal edema with probable tracheal collapse and a subsequent general exhaustion of the patient. There was one instance of severe wound infection due to the streptococcus and death occurred in three days from terminal bronchopneumonia. Another fatality occurred following the intravenous administration of glucose solution. One patient failed to regain consciousness and the cause of death was not determined. Another death followed two and a half months following double resection for adenomatous goiter. There was in this case a complicating cystitis followed in time by a prostatic abscess and cellulitis and the patient died of sepsis. Another fatality occurred in a young girl with severe hypothyroidism, bordering on cretinism. This patient had a large adenomatous goiter producing obstruction. Twenty-two hours following operation she developed generalized convulsions from which she died.

In our attempt to control all the direct and contributory causes of death following thyroid operation, it becomes apparent that postoperative crisis is very definitely the one cause of death with which we cannot adequately cope. It must be remembered however that even though the preoperative hyperthyroidism is partially controlled, the fundamental hypersensitiveness of the patient to operative procedure may still be present to a considerable degree. This sensitivity reveals itself in the emotional reactions of the patient during the immediate preoperative period, as in bringing her to the operating room, and just before anesthesia is begun. This sensitivity is more particularly apparent in the reactions produced by trauma and all other factors which are unavoidably associated with operation. The preoperative manifestations of tachycardia, nervousness, flushing, tremor, throbbing, perspiration, are secondary to the emotional factor of anxiety. Similarly the operative reactions of increased tachycardia, increased blood pressure and pulse-pressure, marked leukocytosis with a striking mononucleosis, increased blood sugar and a rise of body temperature are secondary to trauma and other injurious factors inherent in every major operation.

In studying these reactions critically, it became apparent that they resembled in every way the manifestations produced by the injection of small amounts of adrenalin in patients with hyperthyroidism. I had become thoroughly familiar with these reactions after many years of experience with the administration of adrenalin to many hundreds of patients suffering from goiter. It appeared furthermore that those patients who were particularly sensitive to adrenalin, as determined by my adrenalin test, practically always showed proportionately sharp preoperative and operative reactions. In addition there were often postoperative reactions entirely characteristic of and simulating the responses produced by the administration of adrenalin. Even the findings in crisis were merely greatly exaggerated expression of the changes produced by adrenalin and operation. Accordingly throughout our studies of these various reactions, there appeared reason to believe that the responses were undoubtedly produced by adrenalin. We then determined to study more critically the factor of adrenalin in the causation of the operative reactions and the postoperative hyperthyroidism and even crisis in the hope that by taking this factor into account some of the fatalities due to crisis might be avoided.

Many years of experience with the epinephrine hypersensitiveness test showed that certain characteristic reactions are produced when epinephrine or adrenalin is administered to clinical subjects with hyperthyroidism. Thus it was found (Goetsch[2]) that when a dose of 0.5 c.c. of 1:1000 solution of epinephrine is injected subcutaneously into the patient with hyperthyroidism, the following signs and symptoms are produced. There occurs an early and at times a sharp rise of systolic blood pressure and an increase in the pulse rate of ten to fifty or more points. Concomitantly, a moderate fall of the diastolic pressure takes place. As a result the pulse, which is indicative of the work of the heart, is greatly increased. The respirations become deeper and are often moderately accelerated. Simultaneously there occurs an exaggeration of the clinical picture of hyperthyroidism, especially of the nervous manifestations. Thus we see increased tremor, apprehension, precordial and peripheral throbbing, asthenia and in fact practically all the symptoms of which the patient may previously have complained. Vasomotor responses are also characteristically found after the injection of adrenalin. Thus the initial vaso-constriction with pallor and coldness of the hands and feet is followed by vasodilation with flushing and sweating. There is also a rise in body temperature and slight diuresis may occur. At the end of an hour to an hour and a half, the clinical status of the patient returns to normal. Further studies conducted several years ago and presented in a paper before the American Association for the Study of Goiter in May, 1933 (Goetsch and Ritzmann[3]), showed that a striking leukocytosis occurs promptly after the subcutaneous injection of adrenalin into a patient with hyperthyroidism. The leukocytes may increase from the normal count to 30,000 or even 35,000 per cubic millimeter of blood. The differential count indicated that this leukocytosis was due to a striking mononucleosis in which there were both relative and absolute increases in the mononuclear cells. Simultaneously there occurred a striking diminution in the percentage of polymorphonuclear cells. At the end of one to two hours, the white cell count had returned approximately to the preinjection level. Incidentally an increase in the blood sugar and the body temperature occurred.

Bearing in mind the responses to adrenalin, previously described, we tried as far as possible to detect similar responses in the patient undergoing operation and to our great satisfaction we found that the responses to operation and to adrenalin were remarkably similar (Goetsch and Ritzmann[4]). We found this to be true in our studies during the past few years on the reactions produced by operation on several hundred instances of goiter of varying types and of varying degrees of toxicity.

Similar observations were made on the patient with hyperthyroidism on coming to the operating room, immediately before anesthesia and during the operative procedure. There was found a striking similarity in the responses to adrenalin and in the responses to operation. The differences were those only of degree and not of character and the parallelism was so definite that the charts plotted subsequently are hardly distinguishable as to which represents the epinephrine response and which the operative chart. In comparing the responses produced by the administration of 0.5 c.c. of epinephrine to a patient with toxic exophthalmic goiter with those evoked by a subsequent thyroidectomy, one is struck by the similarity between them. The differences are not of character but of degree, the operative reactions being more pronounced. I have no doubt that the responses to epinephrine could have been made to equal the operative ones by increasing the dose of the drug. So striking is the parallelism between the epinephrine and the operative reactions that it has seemed warranted to believe that the characteristic clinical reactions which are produced by thyroidectomy for hyperthyroidism are caused by hypersecretion of epinephrine resulting from stimulation of the suprarenal glands. This hyperactivity of the suprarenals is produced by the disturbing effect of emotion, apprehension, manipulation, anesthesia, trauma, subconscious pain and all the other factors that comprise a major surgical procedure upon the sensitive hyperthyroid patient. The excessive amount of epinephrine thus developed in turn reacts upon a sympathetic nervous system rendered hypersensitive by the existing hyperthyroidism.

We have found furthermore that the postoperative hyperthyroidism is proportional to the degree of operative reactions, which in turn have been shown to be related to the epinephrine sensitivity. In other words, an early sharp increase of pulse, blood pressure, pulse pressure and possibly respirations, and a tendency of all of these to rise progressively or to be sustained for any considerable time, should warn the surgeon of the unusual sensitivity of the patient and of a probable sharp postoperative reaction. Thus the desirability of making the operation as brief as possible by adopting a limited stage procedure is readily apparent.

By a proper evaluation of the operative reaction we have a rather new and helpful criterion of the operability of a given patient and a warning as to the extent of operation which may be safely borne by the patient. We are thus helped in deciding the annoying problem so frequently confronting the surgeon as to whether a limited operation or the complete bilateral resection had best be done. If by the time the first lobe has been removed there is no tendency for the pulse and blood pressure to fall, or particularly when these tend to rise, hemithyroidectomy had best be done. In this manner I believe many cases of severe postoperative hyperthyroidism and occasional fatal crisis could be avoided. It may be said furthermore that the behavior of the blood pressure in the form of an increase, which is a characteristic adrenalin response, has come to mean more to us than the behavior of the pulse.

Crisis is an exceedingly fulminating and acute exacerbation of all the manifestations of the preceding hyperthyroidism. Thus if one imagines a great exaggeration in the responses seen following the administration of adrenalin or during thyroidectomy for acute hyperthyroidism, then one appreciates the characteristics of crisis. All of the reactions of crisis are of the nature of the responses to adrenalin in the presence of hyperthyroidism. Crisis itself seems to be a dangerous critical and occasionally fatal clinical storm produced at least in large part by the interaction of the increased adrenal secretion and the sympathetic nervous system which has been rendered hypersensitive by the excessive secretion of thyroxin.

If, as I have indicated, the postoperative hyperthyroidism is a picture of exaggerated operative reactions and is so frequently proportional to them, the surgeon by a proper estimate of the reaction of the patient to the operative procedure is given an additional helpful criterion of operability. He is guided in estimating the extent and duration of the operation which may be safely borne by the patient and may be induced to be satisfied with a stage procedure in instances where an extensive resection operation might be exceedingly dangerous. Furthermore in case of a sharp operative reaction he is warned to begin early and adequate postoperative treatment. One should appreciate too that crisis, when it occurs, virtually begins at the time of operation even though immediately after operation there may be a lull for a period of twelve to eighteen hours, following which the storm usually begins. Just how crisis is initiated, it is difficult to say, but it seems warranted to believe that it is the final summation of a series of reactions brought forth by the operation and involving the thyroid and adrenal glands and the sympathetic nervous system.

The toxic action of the hyperplastic thyroid gland is reasonably controlled by the administration of iodine before operation. The factor of adrenal activity occurring before, during and after operation remains to be explained, evaluated and controlled in order to avoid postoperative crisis. The deleterious factor of adrenalin can however be favorably influenced by eliminating as far as possible all those noxious factors of fear, trauma and operative shock which we now know from our experimental studies are capable of producing harmful reactions in the sensitive hyperthyroid patient. Similar reactions may be produced by the administration of adrenalin. Surgeons are forever indebted to Crile[1] for emphasizing the harmful clinical effects of these factors mentioned and for his technical methods of minimizing them. His technic of anoci-association is familiar to all of you. We need a more definite and specific method or agent, chemical or otherwise, to eliminate the adrenal activity, as we now have to eliminate to a large extent the thyroid toxemia, in order to render thyroidectomy safe from postoperative crisis. It would seem logical that the problem of avoiding crisis lies in the realm of the physiologist and pharmacologist as well as the surgeon. The foregoing analysis would indicate that it is the dangerous element of adrenal activity which is of prime importance and must be controlled to eliminate postoperative crisis. When the etiology of exophthalmic goiter is better understood, this will undoubtedly be possible.

Bibliography

1. Crile, G. W.: Protection of the patient in surgery on the thyroid. Surg., Gynec. and Obst., 32:213, 1921. The present status of Anociation. A critical review. Ann. Surg., 86:251, 1927.
2. Goetsch, E.: Newer methods in the diagnosis of thyroid disorders: Pathological and clinical: B. Adrenalin hypersensitiveness. N. Y. State Jour. Med., 18:259, 1918.
3. Goetsch, E., and Ritzmann, A. J.: The adrenal factor in reactions to thyroidectomy. Studies on thyroid disorders, V. Trans. Amer. Assoc. Study of Goiter, 1933.
4. Goetsch, E., and Ritzmann, A. J.: Thyroid Disorders VI. The suprarenal factor in reactions to thyroidectomy. Arch. Surg., 29:492-510, 1934.

PULMONARY FAT EMBOLISM*

A Pathological Consideration

KANO IKEDA, M.D.

Saint Paul

SINCE a post-mortem diagnosis of pulmonary fat embolism was first made in man by Zenker,[22] in 1862, the rôle of this condition in cardio-pulmonary complications following trauma has been emphasized by a number of observers. Though difficult to treat the subject independently of fat embolism in general, pulmonary fat embolism, when sufficiently extensive, may develop into a distinct clinico-pathologic syndrome which should be recognized as an entity, worthy of the attention of the clinician as well as the pathologist.

Significant as pulmonary fat embolism may sometimes appear to be at necropsy and while admitting the important and perhaps the decisive part it may, at times, play in a fatal outcome, the condition is generally considered as a contributory and seldom the primary cause of death. As early as 1863, von Bergman[1] considered pulmonary fat embolism as a serious complication which might cause death through cardiac paralysis and pulmonary edema, but not as an independent pathologic condition. Scriba[16] (1880) was also led to believe that "pure fat embolism is only rarely fatal and that pulmonary fat embolism in man can never be so extensive as alone to cause death." Domanig[4] (1932), too, came to conclude that "the significance of fat emboli of the lung as a cause of death has undoubtedly been overestimated, and that in many cases the fat emboli are a contributory but not the essential cause of death." Killian[7] (1931) observed that a number of pathologists were rather skeptical about the diagnosis of pulmonary fat embolism as a cause of death.

Indeed, in recent years, the diagnosis of pulmonary fat embolism has been made very rarely in routine necropsy or in clinical diagnosis. Its presence is usually ignored at necropsy and its causal relation to certain cardio-pulmonary complications is seldom emphasized, except in obvious cases. This, at least, is apparently the experience of the average American pathologist. For example, in a series of 14,713 post mortem examinations over a period of twelve years ending in 1931, a diagnosis of pulmonary fat embolism was rendered only in eighteen instances. In four of these twelve years, with an annual series of from 649 to 1,353 necropsies, not a single case was recorded.

Despite such a record as this which prompted Wright[21] (1932) to observe that "charges may be made that American clinicians, and pathologists in general, give too little attention to so important a condition" (fat embolism in general), the rôle of pulmonary fat embolism as a complication and a possible factor in death has not been altogether forgotten and several American investigators have contributed important clinical and experimental studies on this subject in recent years.

---

*From the Pathological Laboratory of the Charles T. Miller Hospital, Inc., Saint Paul, and the Department of Pathology, University of Minnesota, Minneapolis.

Incidence

The general incidence of pulmonary fat embolism in man has been estimated through demonstration of fat emboli in the capillaries of the lungs in given series of routine necropsies. Thus, fat emboli have been found in the lungs in a surprisingly high percentage of the bodies examined, irrespective of the type of death. A large group representing fully 75 per cent of these cases of fat embolism, however, showed no corresponding clinical or anatomic evidence of any pulmonary disease and thus may be designated as the non-clinical or sub-clinical type of pulmonary fat embolism. It may be here stated that there is rarely a case of systemic fat embolism without involvement of the pulmonary capillaries. Killian[7] found only one case out of 112 cases of fat embolism in which the lungs were not involved.

Meeh[13] (1892) collected eleven instances of fatal pulmonary fat embolism in 113 cases of fracture or an incidence of 9 per cent. More recently, Lehman and McNattin[8] (1928) found three fatal cases (6 per cent) in fifty unselected deaths; Vance[18] (1931) recognized fourteen severe (11) and fatal (3) cases (8.5 per cent) out of 164 traumatic deaths and twelve severe (9) and fatal (3) cases (20 per cent) in fifty-nine deaths resulting from the fracture of the lower extremities; and Wright[21] (1932) showed three cases (3 per cent) of high grade (4 plus) pulmonary fat embolism in 100 consecutive necropsies. According to these figures, from 3 to 20 per cent (depending upon the kind of material studied) of these series showed pulmonary fat embolism which was considered either severe or fatal by the investigators. This group of cases, representing probably not more than 25 per cent of the general incidence, is here designated as the clinical type of pulmonary fat embolism which, according to Killian,[7] has been steadily on the increase in Germany during recent years. The present study will be limited to this group of pulmonary fat embolism.

Etiology

It is not the intent of this paper to discuss in detail various etiological possibilities of pulmonary fat embolism (and systemic fat embolism). Fat embolism may be induced, endogenously, through injuries to the adipose tissue by: (1) trauma to the bony system through fracture, jarring of the skeleton, or orthopedic operation and manipulation; (2) trauma to the subcutaneous, intramuscular and other fats through incision (surgery), contusion, infection and the like; and (3) trauma to fatty visceral organs such as fatty liver. It may be brought about, exogenously, following injection or application of various medical oils, as, for example, lipiodol injection into the uterus, the application of vaseline or other oily dressing to exposed areas as burns and the use of a lubricant in dilating the urethra. Then, there is a series of presumptive causes in which certain physical-chemical reaction in the body appears to be responsible for the liberation of fat: chemical poisons such as mercuric chloride, phenol, phosphorus, chloroform, carbon-monoxide, etc.; toxemia from suppuration, tissue destruction (burns); metabolic and chronic diseases including lipemia, notably diabetes, chronic nephritis, tuberculosis, etc. Finally, there are the theoretical assumptions and experimental data which favor de-emulsion of fat in the plasma due to obscure chemical changes and specifically during ether anesthesia.[3, 10, 18] However, the rôle of physical injuries as a cause of fat embolism can not be overemphasized. It would be safe to postulate that pulmonary fat embolism of severe grade probably never occurs without some form of trauma.

The mechanism of the embolic process in traumatic cases appears simple. The open veins tend to "suck" in the freed fat globules. This is aided by the common practice at operation of ligating only the peripheral or bleeding ends of the severed veins but leaving untied the central or unbleeding ends. To this may be added the increased pressure in the involved area from hemorrhage, exudation, etc., which tends to force the liquid fat into the open veins.

There are certain contributing factors which may alter the pathologic processes in pulmonary fat embolism. The more important of these factors may be briefly discussed.

1. The amount of fat which may become embolized in the pulmonary circulation at one time

may vary considerably, depending upon the ability of the terminal capillaries to dilate or remain patent, and upon the force of the heart to overcome the intravascular obstruction. A larger amount of fat may pass through the pulmonary circulation without becoming embolized, if conditions are favorable.

2. Considerably larger quantities are endured if introduced in small divided amounts. Continuous streams of fat discharged into the circulation are likely to cause more acute and profound symptoms.

3. The extent of involvement depends first upon the amount of fat actually present in the pulmonary vessels. This is modified by the preexisting vascular or parenchymal disease of the lung, by myocardial deficiency or by the viscosity of the blood. It may be recalled here that the pulmonary signs obtained following the experimental intravenous injection of oils in animals were interpreted by Magendie,[11] who made the first experimental observation of this kind (1821-1836), to be due to increased viscosity of the blood rather than to fat embolism, which he failed to recognize as such. Gauss[5] observed that 10 per cent of olive oil added to the blood caused an increase in its viscosity by about three times, from which he concluded that the viscosity of the blood should play a rôle in the formation of fat emboli.

4. The presence of infection at the site of trauma may bring about the transfer of microorganisms to the lung in fat globules and thus facilitate the development of pneumonia or embolic abscess. Or, pathogenic bacteria may gain access directly through the upper respiratory tract and find fertile field in the involved areas of the lung.

5. The age is an important factor, not only because of the increasing preponderance of fluid fat (olein) in the adipose tissue with advancing years but also because of the increasing incidence of cardio-vascular diseases and chronic fibrosing pulmonary lesions among the older individuals.

6. The most important factors concerned appear to be the presence of a preexisting pulmonary or cardiac lesion which tends to cause added burden on the cardiac reserve and bring about myocardial failure.

Any one or more of these factors may alter the clinical course and the pathologic picture of pulmonary fat embolism.

Symptoms

The clinical signs and symptoms of pulmonary fat embolism usually develop shortly following the trauma and are due primarily to the obstruction of the pulmonary circulation by the emboli. The signs of resulting congestion and edema are soon evident. Dyspnea and cyanosis of varying intensity are present and irritating cough may persist, accompanied by expectoration of foamy pulmonary secretion may become copious. mucoid material, often streaked with blood. The Globules of fat may be easily demonstrated in the sputum. A general appearance of shock with a lowered arterial pressure will soon prevail. The temperature is often subnormal. The pulse becomes rapid, thready and irregular and the cardiac tones weak and muffled. Vomiting may come in spells. Mental agitation, headache, stupor and unconsciousness may successively supervene, due to cerebral anoxemia. This is the usual picture of surgical shock following a major operation or severe injury. Bissel[2] (1917) called attention to the possibility that pulmonary fat embolism might frequently be confused with postoperative surgical shock as a cause of death. He reported several clinical cases with necropsy findings and demonstrated experimentally in dogs a sudden drop in arterial blood pressure with resulting death, following the intravenous injection of olive oil. Wiggers[20] (1917) and Simmonds[17] (1918) also showed a close association of lowered blood pressure and shock from experimentally induced pulmonary fat embolism.

Areas of impaired resonance are soon elicited and showers and bubbles of coarse, moist râles are heard throughout the lungs. There may be a demonstrable increase in cardiac dullness to the right.

The demonstration of fat droplets in the sputum and urine was considered to be of important diagnostic aid by earlier observers. The mere presence of fat drops in the sputum cannot be taken as a sign of pulmonary fat embolism.

Often the pulmonary signs may not become evident until after an interval of several days. This is partly accounted for by the fact that during the initial hours the pulmonary capillaries are well able to accommodate the accumulating load of emboli without embarrassing the pulmonary function, and the heart is easily capable of forcing the fat globules into the systemic circulation.

Acute pulmonary symptoms may subside suddenly or may disappear slowly, depending upon the condition of the heart and the amount of the embolized fat.

Complications may develop as a result of secondary infection or of cardiac failure. Secondary pneumonia is a common complication in which death may be the final outcome.

Death attributable directly to acute fat embolism of the lungs may occur on rare occasions. This is brought about through the rapid introduction of fat into the blood stream in amounts sufficiently large enough to cause an acute obstruction of the pulmonary circulation. Death results from acute pulmonary edema, asphyxia, anoxemia or right heart failure and occurs within a few minutes to a few hours. As a rule, however, death comes after an interval of several days from rapidly developing cardiopulmonary complications or from a coexisting primary disease or injury in which pulmonary fat embolism plays a contributory role.

Pathology

The literature on fat embolism fails to adequately describe the pathological lesions of the lungs in their progressive sequence.

Warthin[19] observed, grossly, edema, congestion, hemorrhagic infarction and acute emphysema of the lung. Oil droplets were demonstrated in the bloody fluid. Microscopically, fat emboli were demonstrated, evenly distributed throughout the lung, and the capillaries dilated to two to six times their normal diameter. The fat drops became confluent in branching cylinders. In the larger arterioles, the fat droplets formed in spherical masses. Blood platelet and fibrin emboli and bronchopneumonia constituted the late secondary changes.

He also observed numerous emboli of what he considered as bone-marrow cells. He noted the presence of many fat-laden phagocytes in the alveoli, the finding of which in the sputum he regarded as pathognomonic of pulmonary fat embolism. Grondahl[6] stated that, in some cases, the hemorrhage was so large that the lung as a whole appeared penetrated by bloody infarcts. Microscopically, he noted a uniform distribution of fatty emboli which were less numerous in the areas of congestion, edema and of pneumonia. He saw only rarely, large infarcts, the rupture of the pulmonary vessels, or the passage of the fat into the alveoli. Vance[18] observed the lung voluminous and cyanotic. Microscopically, bronchopneumonia and fibrin thromboses were present. He also reported the presence in the alveoli of large spherical cells containing fat globules. Miloslavich[14] raised a question, in reporting a case, as to whether there might be a connection between fat embolism of the lung and pulmonary thrombosis, found simultaneously throughout the lungs, following a fatal fracture, death occurring in twenty hours. It is of interest to recall, in this connection, the statement made by Rosenthal[15] and others that pulmonary embolism is most frequent in obese individuals.

This observation raises the question as to whether the insignificant primary fat emboli such as are easily obtainable in obese subjects may not be the basis of more serious pulmonary emboli. This assumption has been denied by Killian[7] and others who failed to obtain statistical collaboration on such a possibility. Makai[12] suggested that bronchopneumonia, frequently observed in elderly people after fracture might possibly have relation to fat emboli in the lungs.

Pathologic Classification of Pulmonary Fat Embolism

In the light of our present knowledge, pulmonary fat embolism may be considered pathologically under the following heading:

Pulmonary Fat Embolism

A. Non-Clinical (Sub-Clinical) Type
  About 75 per cent of the incidence (estimated)
  Of academic interest only

B. Clinical Type (25 per cent of the general incidence, estimated)
  I. Immediate (Early) Phase
    a. Sudden Death
    b. Recovery
    c. Merge into the Delayed Phase
  II. Delayed Phase (Complication)
    a. Non-Suppurative Type
      1. Localized
      2. Diffuse (Lobar or Hemorrhagic)
    b. Suppurative Type
      1. Lobar (Hemorrhagic)
      2. Bronchopneumonic
      3. Embolic Abscess
  III. Remote Phase (Complication)
    a. Chronic Interstitial Pneumonia
    b. Chronic Embolic Abscess
    c. Pulmonary Thrombosis

Three pathologic phases of pulmonary fat embolism of the clinical type may be recognized: the early or immediate phase, the delayed phase and the remote phase. The clinical picture in the early phase is characterized by a sudden onset, acute symptoms and a comparatively short course either in fatal or recovered cases. In the delayed, the onset may or may not be sudden, the symptoms progressive and the course more or less prolonged. This phase often follows the early phase or may develop after an interval of a few days or weeks. Outcome may be favorable or death may take place from various complications. These two phases correspond, in the main, to the two clinical varieties—one of violent onset and severe clinical picture and the other of slower development and more prolonged course—as distinguished by Grondahl[6] and Vance.[18] The third phase constitutes remote results or complications which are occasionally met with but seldom recognized as such, either clinically or at necropsy.

The Immediate Phase

In moderate quantities, especially when released in streams, continuous or at short intervals, the immediate effect of fat embolism upon the lung is manifested clinically by cyanosis, dyspnea and the physical signs of congestion and edema, usually with liberal amounts of mucoid expectoration. Grossly the lung is moderately heavy and edematous and shows areas of hemorrhage. It may show a lobar distribution or may be confined to localized areas.

Microscopically, the alveolar septa are widened, the capillaries engorged and many of them filled with a short column of fat, often in a branching form. The alveolar spaces may be collapsed or filled with edematous fluid and extravasated blood mixed with droplets of fat. A few of the larger branches of the pulmonary artery may show plugs of spherical fat drops. Much of the fat is soon carried over into the venous side and into the left heart either to be disposed of through the excretory organs or carried to other vital organs, notably the brain. The remaining fat soon escapes into the alveolar spaces by diapedesis, to be expectorated in sputum. The edema and congestion are gradually relieved and the clinical signs of improvement are soon evident or the condition may merge into the delayed phase.

In massive or larger quantities, the vascular obstruction in the lung by the oncoming fat may be so sudden and so complete that the immediate relief is usually impossible and death may result early through asphyxia or through the failure of the right heart against the great increase in the intrapulmonary arterial pressure. Pathologically, fat emboli are not only demonstrated, evenly distributed in many of the alveolar capillaries but in many of the larger vessels. The appearance of the secondary changes in the lungs due to the sudden massive embolism of the entire pulmonary circulation depends upon the length of time which elapses between the onset and death. Preexisting cardiac and pulmonary lesions usually play an important role in such death. Except for the multiple fat emboli, the lung may appear essentially normal.

The Delayed Phase

A Non-Suppurative Type.—Continued retension of the embolized fat in large quantities in the pulmonary circulation results in a series of changes which are partly accounted for by vascular blockade and partly due to the proliferative tissue reaction to the relatively inert free fat, acting as a foreign body.

During the earlier stage, all that may happen is a congestion and edema on the basis of vascular stasis. This is soon followed by hemorrhages which usually occur in patches immediately about the embolized capillaries. The lung is lumpy and shows alternating areas of poor crepitation and emphysema. Microscopically, there are numerous areas of edema and extravasation in which are demonstrated fatty emboli of the capillaries and secondary vessels. The surrounding parenchyma shows patches of atelectasis and emphysema. Occasionally, congestion, edema and hemorrhage may rapidly assume the proportion in which one or more lobes may become involved, presenting an appearance of a massive infarction or a hemorrhagic pneumonia. Grossly, the lung is heavy and voluminous. The pleura is stretched, shiny and dark, bluish red in color. It is airless and rubbery in consistence. The cut surface is uniformly dark red. Blood escapes freely and is mixed with many droplets of fat, a finding which, under proper technic, may be considered diagnostic of this condition (Warthin, Bissel). Microscopically, there is a massive hemorrhage and edema diffusely hroughout the involved areas with infiltration, here and there, of macrophages in small numbers. Many of these macrophages ingest fat globules while others engulf free fat masses in he alveoli and tissue spaces. A local proliferation of fibroblasts invariably accompanies the phagocytosis. There is an attempt to organize he emboli which become enmeshed in fibrin and stimulate infiltration of mononuclear cells, macrophages and proliferation of fibroblasts in the mmediate neighborhood.

Case 1.—W. C., male, aged seventeen, in the afternoon of July 23, sustained a fracture of the right femur and clavicle, a compound fracture of the right ibia and fracture of the skull. He regained consciousness soon after the accident but became stuporous wenty-four hours afterward and remained until death. He was paralyzed in the left arm; died, July 27, three and a half days after the accident. The cause of death was fracture of the skull.

At necropsy, the right lung weighed 975 grams and he left 850 grams. They were voluminous and showed areas of sub-pleural petechial hemorrhage. Crepitation was reduced. The cut surfaces gave a mottled, hemorrhagic appearance with excess blood and fluid. There was no definite consolidation and no pus (Fig. 1, *A*). Microscopically, sections of the lungs showed large areas of diffuse edema and hemorrhage in which was seen the network of alveolar capillaries. In some areas, blood was massive and solidly packed and occasionally hemolyzed. Only rarely were there macrophages and leukocytes wandering in the alveolar spaces and septa. The presence of fat was readily demonstrated in the alveolar capillaries as solid columns, often branching, and in the alveolar spaces as droplets of various size. Larger branches of the pulmonary artery also contained conglomerate drops of fat which appeared adherent to the intimal surface (Fig. 2). Much of the fat was free in the alveolar spaces.

B. Suppurative Type.—In a majority of cases, sooner or later microörganisms gain entrance into the involved areas either directly from the upper respiratory passage or from the infected primary wound through the blood stream. This results in the development of pneumonia. Such pneumonia may be considered in two groups, depending upon the amount of embolized fat or the extent and degree of the primary congestion, edema and hemorrhage, upon the number and virulence of the invading bacteria and upon the local tissue reaction against the foreign agents. The first group may be designated as the lobar or hemorrhagic type, and the second the bronchopneumonic type.

In the hemorrhagic type, the dominant feature is a massive edema and hemorrhage of a lobar distribution which is heavy, voluminous, airless and dark red in color, indistinguishable from the lungs of acute hemorrhagic pneumonia. The gross appearance of the lung may not be differentiated from that found in the non-suppurative diffuse hemorrhagic type of pulmonary fat embolism already described. Microscopically, the alveolar capillaries are engorged and the alveoli filled with freshly extravasated blood. A few macrophages and many polymorphonuclear leukocytes are scattered about within the serosanguinous fluid. The septal stroma and peribronchial and perivascular tissues are congested, edematous and show areas of massive leukocytic infiltration. Fat droplets are readily demonstrated not only in the loops of the alveolar capillaries but within the alveolar spaces either as free fat droplets or phagocytized within macrophages which are often conspicuous by their presence. Larger branches of the pulmonary

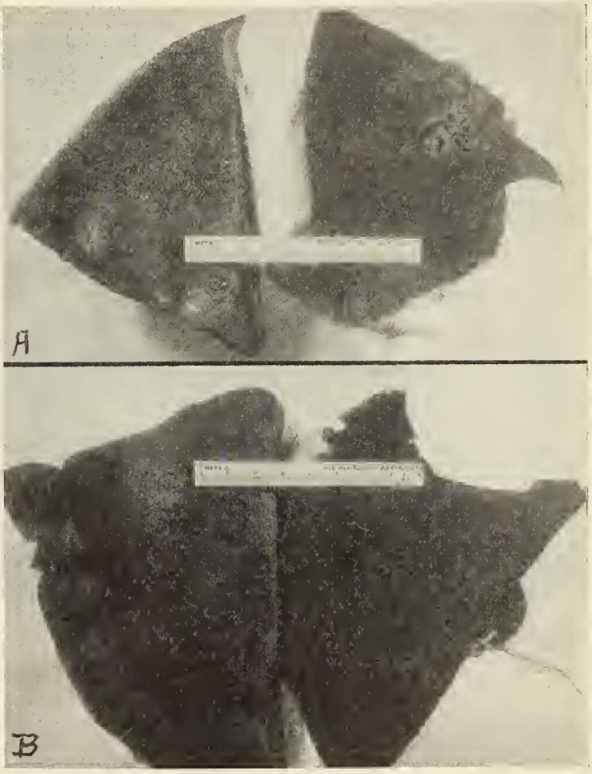


Fig. 1 *A*. The lung in Case 1, after fixation, showing diffuse edema and congestion and a stretched shiny pleural surface.

B. The lung in Case 2, after fixation, showing diffuse congestion, hemorrhagic consolidation and a stretched, shiny, cyanotic pleural surface.

artery may show several masses of embolized fat in the lumen. Active proliferation of fibroblasts in the perivascular areas and in the alveolar septa, here and there, may be demonstrated, but not in a conspicuous degree.

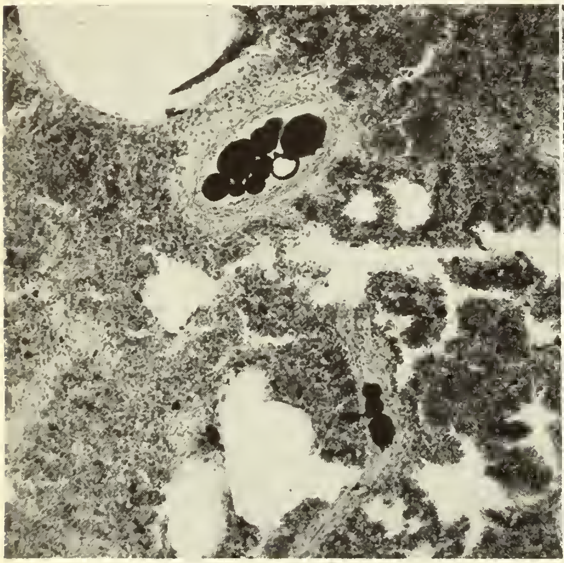


Fig. 2. A section from the lung in Case 1, showing fat emboli in larger vessels and a few fat globules scattered over the field. Note edema and congestion with areas of emphysema.

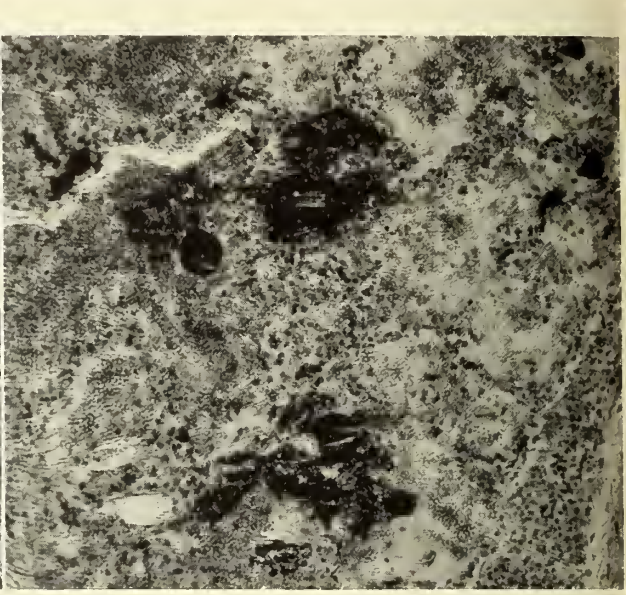


Fig. 3. A section from the lung in Case 2, showing diffuse edema, areas of extravasation and few neutrophils scattered over the field and a collection of pus cells along a large artery. Note large fat drops and smaller globules in the field.

Case 2.—C. P., male, aged twenty-eight, on June 5, at 8:30 p. m., sustained a compound fracture of the left leg. He became unconscious and developed convulsion and fever the next afternoon. The left arm became paralyzed. Death occurred at noon, June 10, five days after the accident.

At autopsy, the right lung was 1,095 grams in weight and the left 1,220 grams in weight. The pleural surfaces were stretched, glistening and cyanotic. Crepitation was absent. The cut surfaces were diffusely hemorrhagic and edematous. A few small droplets of pus, mixed in copious amounts of bloody fluid, were obtained (Fig. 1, *B*).

Microscopically, there were areas of massive edema and hemorrhage, with blood often undergoing hemolysis. The capillary loops were fairly well preserved but the spaces appeared distended, in most instances. There were large foci of massive collection of pus cells which obliterated the alveolar markings. There were also extensive peribroncheolar and perivascular infiltration of pus cells. Macrophages were more numerous and proliferation of fibroblasts more noticeable than in Case 1. The amount and the extent of the distribution of the fat appeared essentially identical as in Case 1. The only notable difference between the two appeared to lie in the absence in one, and the presence in the other, of purulent inflammation (Fig. 3).

In the bronchopneumonic type, there are small areas of grayish consolidation scattered in the lung which otherwise shows a diffuse edema and congestion and somewhat of a rubber-like consistence. A large amount of bloody, frothy fluid escapes freely, in which may be mixed a few droplets of pus. The gross appearance is that of a typical hypostatic bronchopneumonia. Microscopically, free fat droplets are scattered over the field, in the alveoli and in the septa. Capillary segments, filled with the embolized fat, are also recognized. Areas of massive infiltration of pus cells are noted throughout, peribronchially and within alveolar spaces. Only the history of trauma (fracture) and the demonstration of fat globules in the pulmonary capillaries enable one to distinguish this type of pneumonia from other types of bronchopneumonia.

Case 3.—H. T., female, aged sixty-five, was in automobile accident July 22, sustaining multiple rib fracture and possibly cerebral hemorrhage. She died July 28 from bronchopneumonia. The necropsy showed a heavy pair of lungs, not weighed, with irregular crepitation and areas of grayish consolidation from which pus was expressed. Diagnoses: Broncho-pneumonia, cerebral hemorrhage and multiple rib fracture.

Case 4.—A. S., male, aged forty, was in an automobile accident, July 23, sustaining fracture of the ribs and humerus. Two days later, he was transported for a distance of 75 miles in an automobile. He soon developed a high fever and signs of bronchopneumonia and died, July 26. At necropsy, the right lung weighed 900 and the left 800 grams. They presented a typical appearance of broncho-pneumonia.

Microscopically, the lungs from both Cases 3 and 4 howed an essentially identical picture. There were vide areas of diffuse edema and congestion and patches of bronchopneumonia. Fat droplets were scattered over the field and in the alveolar capillaries and larger vessels (Fig. 4).

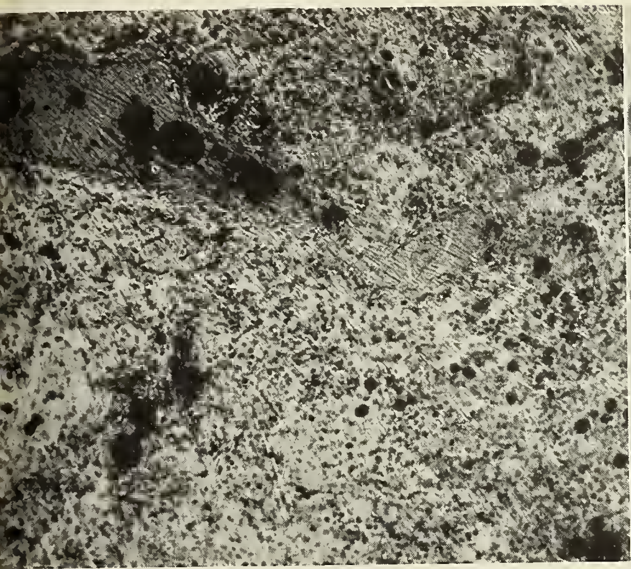


Fig. 4. A section from the lung in Case 4, showing diffuse edema and slight congestion throughout the field; collection of pus cells in a bronchiole and a few of them scattered about the field. Large and small fat globules in the lumen of a larger vessel and many others scattered all through the section.

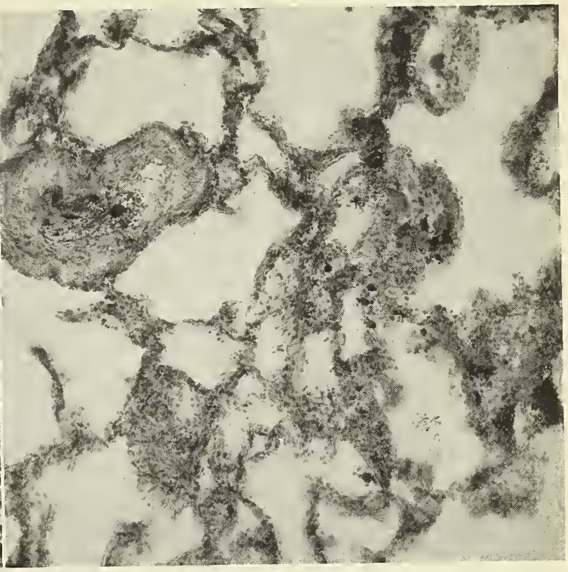


Fig. 5. A section from the lung in Case 5, illustrating an organizing embolus in a small vessel and a few small droplets scattered in the alveolar capillaries. Areas of interstitial proliferation and emphysema. Death one and one-half months after the accident.

Remote Phase

Occasionally, minute areas of nodular consolidation may be encountered throughout the lungs in cases where death occurs weeks or months after the onset of the illness. These nodules may represent a small localized pneumonitis which is interpreted to be a remote result of disseminated pulmonary fat embolism in which minute globules of unabsorbed fat form local centers for proliferative foreign body reaction. The lung may appear normal grossly or may show patches of terminal bronchopneumonia. As a terminal event, there may be a thrombosis of the secondary branches of the pulmonary artery with resulting areas of infarct or a massive occlusion of the main pulmonary trunks. Microscopically, the small nodule consists of a clump of macrophages, a few leukocytes and fibroblasts and usually one or two foreign body giant cells, in the center of which may be recognized a nucleus of a fat globule or two. The nodule is usually surrounded by a zone of collapsed alveoli. These areas may be found within a bed of frank pneumonia. Essentially, these nodules represent a foreign body reaction around residual fat globules, which stimulates the production of non-suppurative, interstitial, proliferative pneumonitis and persists for weeks or months. They have no clinical bearing on the case as such.

Case 5.—M. O., female, aged eighty-nine, sustained a fracture of the right femur, July 3. Blood pressure was 100/50-90/52. Usual treatment was given, but the patient died August 17 or one and a half months after the accident. At necropsy, death was attributed to old age and cerebral softening. The right lung weighed 380 grams and the left 360 grams. Grossly, the lungs were described as normal. Microscopically, however, the alveolar loops for the most part were stretched and emphysematous but there were a few small patches of atelectasis in which were observed areas of capillary engorgement and localized collections of leukocytes. Some of the alveolar septa were thickened and fibrous. A few of the bronchioles were filled with purulent exudate. Small droplets of fat were demonstrated in many of the loops of the capillaries and a few of the larger arterial branches. The fat emboli lying in the lumen of some of the larger vessels were apparently undergoing organization (Fig. 5).

Experimental Pathology

The histopathologic observation on experimentally induced fat embolism in the lungs of laboratory animals has been recorded with comparative brevity by all investigators. A comprehensive review of the experimental work as well as the literature on fat embolism in general was published by Ceelen[3] in 1931. In 1929, Lehman and McNattin[9] rendered a fairly detailed account of the pathology of the lungs in dogs subjected to intravenous injections of cottonseed oil. Grossly, they noted an early edema and miliary hemorrhages; later, fewer hemorrhages and less edema, patches of consolidation and of emphysema and a few definite areas of bronchpneumonia. After three weeks, they noted a few areas of consolidation but no edema or hemorrhages. Microscopically, the primary effect on the lung was entirely mechanical with blocking of capillaries and the resulting passive congestion, edema, diffuse miliary hemorrhages by diapedesis or rupture. Later, within a few hours, there was infiltration of neutrophils and mononuclear cells. Within a few days, there was proliferation of endothelial leukocytes and fibroblasts. The alveolar spaces became narrowed and the septa markedly increased in thickness. In the septa was a massive infiltration of endothelial cells, a few neutrophils, mononuclear cells and occasional fibroblasts. Small fat globules were observed within many of the "endothelial cells." Later, there was an increase in fibrous tissue elements while the endothelial cells became diminished in number. Fat was not observed, as a rule, after three weeks.

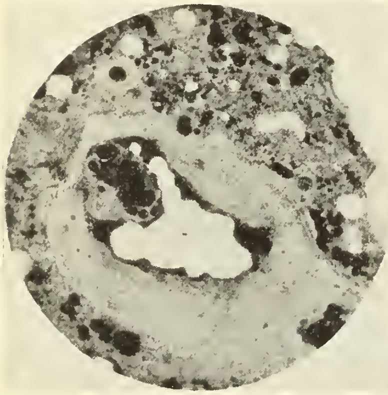


Fig. 6. A section of a larger artery from rabbit receiving 1 c.c. of rabbit fat intravenously, daily for three doses, death occurring immediately after the last injection. Note a beginning organization of the emboli.

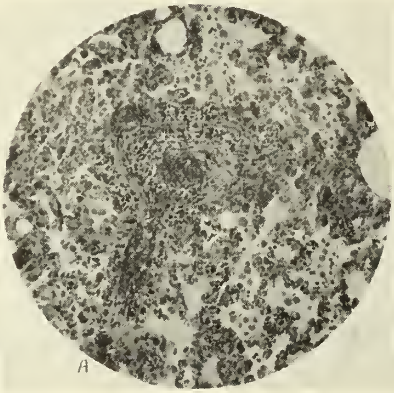


Fig. 7 *A*. A section of a terminal capillary (H. and E. stain) from the same rabbit, showing an early proliferative reaction in and about the lumen with beginning thrombosis. Note edema and infiltration of macrophages within the alveoli.

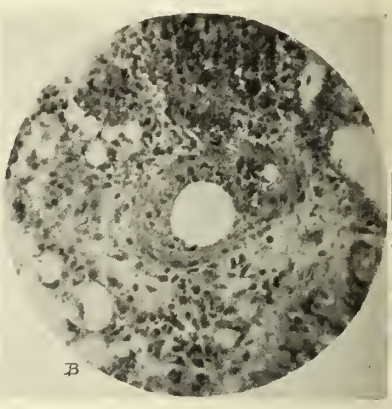


Fig. 7 *B*. A section of an arteriole (H. and E. stain) showing an early organization of the embolus. Rabbit received intravenously 1, 1, 2 c.c., respectively, of lipiodol every day, death resulting four hours after the last injection.

My own findings in the lungs of rabbits, following the intravenous injections in varying amounts and at various intervals of lipiodol, human and rabbit fats and other oils were essentially identical with the observations of Lehman and McNattin.

The more striking features of these experiments were (1) the rapidity with which the fat globules passed through the pulmonary capillaries into the general circulation; (2) the early attempt to organize the fatty emboli by fibrin deposit and proliferation of fibroblasts and macrophages; (3) early perivascular proliferation of fibroblasts and macrophages which invaded the wall of the vessel and migrated into the embolus; and (4) the formation of small localized proliferative nodules with minute fat residue as a nucleus in the lungs of animals which survived the active phase of pulmonary fat embolism.

Injections, daily or on alternate days, of a sub-lethal dose (0.5 of fat) intravenously brought about the death of the animal in two or three days. Grossly, the lung was heavy and voluminous, dark purplish-red in color, either diffusely or in large patches, and diffusely waterlogged. Microscopically, there was, as a rule, an extensive capillary fat embolism with a resulting diffuse congestion, edema and hemorrhage throughout the lung. Many of the larger arteries were also involved in the embolic process (Fig. 6). This was accompanied by a perivascular infiltration of macrophages and neutrophils, a proliferation of fibroblasts with attempt to organize the embolized fat (Fig. 7, *A* and *B*). In non-fatal animals, fat emboli usually disappeared completely from the lungs in a course of from three to six weeks. In a certain number of animals residual pneumonic patches in the form of small microscopic nodules persisted for several weeks. Such nodules were found to consist, microscopically, of an aggregation of a few macrophages, leukocytes and fibroblasts with a small globule of fat as a nucleus and, as a rule, one or two foreign body giant cells in the neighborhood. They merely represent small, localized, proliferative pneumonitis occasioned by the persistent presence of foreign fat (Fig. 8).

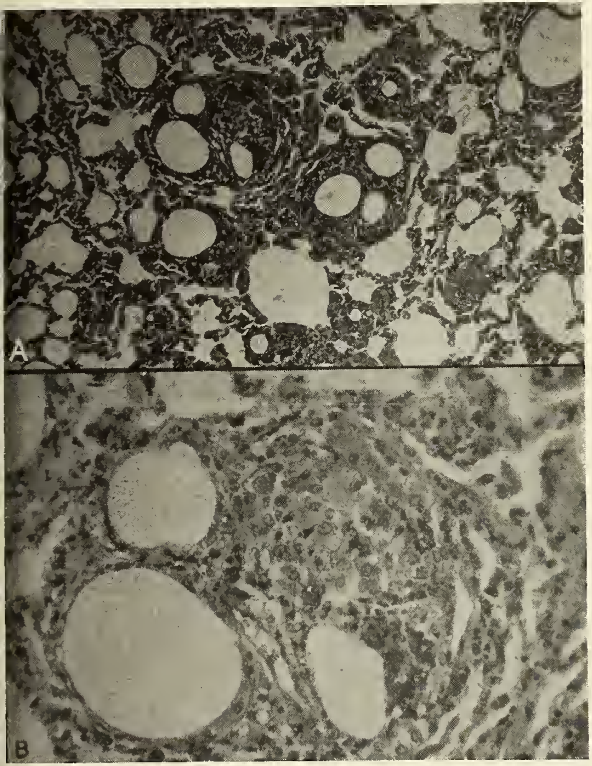


Fig. 8. A section of the lung of a rabbit, receiving 0.5 c.c. of lipiodol, intravenously, at varying intervals, four times and killed twenty-seven days after the first injection and ten days after the last, showing areas of small, nodular, proliferative penumonitis (non-suppurative). Note clumps of oil ingesting macrophages surrounded by a zone of productive inflammation.

The following interesting observation may be recorded. Massive pulmonary embolism was induced by a single injection of lipiodol (4 c.c.) under fluoroscopic guidance into the marginal vein of a rabbit's (2.5 kgm.) ear, which rapidly filled the right chamber of the heart and the entire pulmonary circulation, being soon followed by a few moments of myocardial fibrillation and death. The lungs of the animals so killed merely showed massive fat embolism of the pulmonary vessels with little edema or hemorrhage. A rapid dissemination of the fat beyond the pulmonary capillaries was demonstrated in such animals by the presence of fat emboli in other visceral organs. In one animal, a main trunk of the conorary artery was found completely occluded by fat embolus (Fig. 9). This experiment suggests two possibilities in man: one pointing to the occurrence of fatal pulmonary fat embolism without the usual congestion, edema and hemorrhage; and the other, the incidence of sudden death on the basis of acute coronary occlusion and myocardial fibrillation.

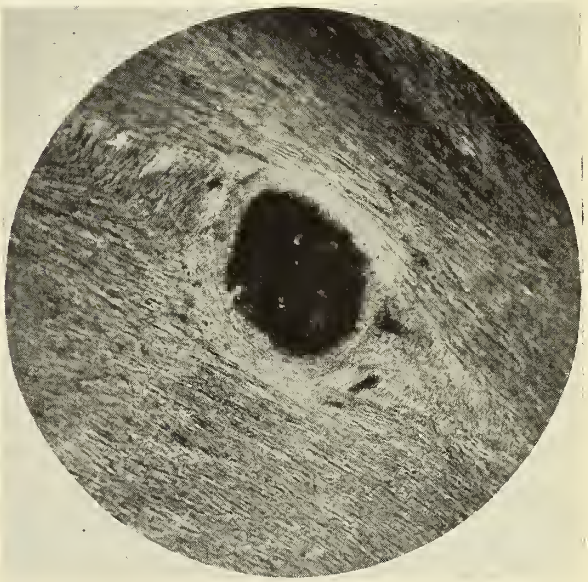


Fig. 9. A section of the heart showing a main trunk of the coronary artery, completely occluded by a mass of fat drops. Rabbit received a single dose of 5 c.c. of lipiodol and died almost immediately.

Pulmonary fat embolism and pneumonia were also produced in rabbits and rats by fracturing the femur and scraping vigorously the marrow of the broken shafts.

Conclusions

1. Pulmonary fat embolism may be divided into two types, the non-clinical or sub-clinical type and the clinical type.

2. Contrary to prevailing impression, pulmonary fat embolism may occasionally present a distinct clinico-pathologic syndrome which deserves due recognition both clinically and at necropsy.

3. Various pathologic types of pulmonary fat embolism with their corresponding clinical manifestations are discussed. Illustrative cases are cited.

4. Pulmonary lesions in experimentally induced fat embolism in animals are described and evaluated in the light of the findings in human cases.

5. It is concluded that pulmonary fat embolism may play an important role in the causation of cardio-pulmonary complications following severe trauma, oftener than is generally realized, and that, therefore, a possible occurrence of this condition should be borne in mind, both by the clinician and the pathologist.

Bibliography

1. von Bergmann: Zur Lehre d Fattembolie, Dorpat, 1863. Cited by Warthin.
2. Bissel, W. W.: Pulmonary fat embolism, a frequent cause of post-operative surgical shock. Surg., Gyn. and Obst., 25:8. 1917.
3. Ceelen, W.: Die Kreislaufstörungen der Lunge, in Henke, F., and Lubarsch, O.: Handbuch d. sp. path. Anat. und Hist., Berlin, Julius Springer, 1928, 3; Part 3, p. 74.
4. Domanig, E.: Experimentalle Untersuchungen über die Fattembolie. Deut. Ztschr. f. Chir., 236:698, 1932.
5. Gauss, H.: Pathology of fat embolism. Arch. Surg., 9:593, 1924.
6. Grondahl, N. B.: Untersuchungen uber Fattembolie. Deut. Ztschr. f. Chir., 111:56, 1911.
7. Killian, H.: Die traumatische Fattembolie. Deut. Ztschr. f. Chir., 230:97, 1931.
8. Lehman, E. P., and McNattin, R. F.: Fat embolism, incidence at postmortem. Arch. Surg., 17:179, 1928.
9. Lehman, E. P., and McNattin, R. F.: Fat embolism: pathology of lungs in experimental fat embolism. South. Med. Jour., 22:201, 1929.
10. Lehman, E. P., and Moore, R. M.: Fat embolism, including experimental production without trauma. Arch. Surg., 14:621, 1927.
11. Magendie: Cited by Warthin.
12. Makai, E.: Zur Frage der Fattembolien. Zentralbl. f. Chir., 59:521, 1932.
13. Meeh: Beitr. z. klin. Chir., 1892, cited by Warthin.
14. Miloslavich, E. L.: Fat embolism: Medico-legal aspect. Wisconsin Med. Jour., 29:139, 1930.
15. Rosenthal, S. R.: Thrombosis and fatal pulmonary embolism. Arch. Path., 14:215, 1932.
16. Scriba, J.: Untersuchungen über die Fattembolie. Deut. Ztschr. f. Chir., 12:118, 1880.
17. Simmonds, J. P.: A study of the low blood pressure associated with anaphylactic and peptone shock and experimental fat embolism. Jour. Exp. Med., 27:539, 1918.
18. Vance, B. M.: Fatal fat embolism. Arch. Path., 7:554, 1929; The significance of fat embolism. Arch. Surg., 23:426, 1931.
19. Warthin, A. S.: Traumatic lipemia and fatty embolism. International Clinic, Philadelphia: J. B. Lippincott Co., Twenty-third Series, 6:171, 1913.
20. Wiggers, C. J.: Fat emboli and shock. Proc. Soc. Biol. and Med., 15:34, 1917.
21. Wright, R. B.: Fat embolism. Ann. Surg., 96:75, 1932.
22. Zenker, F. A.: Beit, z. norm. u. path. Anat. d. Lunge. 1862, cited by Warthin.

MEGACOLON

With Report of a Traumatic Case Treated by Left Lumbar Sympathectomy

L. HAYNES FOWLER, M.D., F.A.C.S., and WILLIAM A. HANSON, M.D.

Minneapolis

THE beneficial effects of lumbar sympathetic ganglionectomy and ramisection in megacolon, first reported by Wade and Royle in 1927, has stimulated a widespread interest in this distressing and relatively unusual condition.

The term megacolon is used to describe any dilated, hypertrophied giant colon. There are two main types. The first and most common form is the congenital idiopathic dilatation described by Hirschsprung[14] in 1888. The other or acquired type usually occurs later in life and results from an obstructive lesion in the lower bowel, rectum or anal canal. Rankin and Learmouth[27] reported seventy-six cases of megacolon having been seen at the Mayo Clinic between January, 1908, and October, 1931, sixty-two of which were of the idiopathic type and fourteen of the secondary type. Mummery[21] reports 100 cases of megacolon and concludes that those seen in older people are merely congenital cases which have survived. Shelley,[32] Bailey,[4] Brenneman,[6] David,[9] Gant,[11] Lefevre and Jonchires,[20] Rankin,[25] and Macaige,[23] report cases secondary to obstructive lesions.

---

*Read before the Minneapolis Surgical Society March 11, 1935.

Etiology

The essential pathologic factors which cause congenital megacolon are unknown. Many theories have been advanced to explain the condition. Examination of resected specimens has failed to demonstrate any change in the neuromuscular mechanism of the colon which would account for the disease. The improvement following sympathectomy in these cases would lead one to assume that these nerves were hyperactive, but this is not necessarily true. And, if so, what makes them overactive? The theory of neuro-muscular incoördination is most widely accepted. In discussing this subject, Rankin and Learmouth[27] conclude with, "the opinion that the gross pathologic features demonstrated universally in these cases are results of secondary changes due to some unexplainable and undemonstrable type of obstruction low in the colon, intrinsic, neurogenic or mechanical." This statement covers a "multitude of sins" and about expresses our present lack of knowledge of the exact underlying cause of this disease.

Pathology

The pathological findings in congenital megacolon are characteristic and quite constant (Fig. 4). The colon is hugely dilated, elongated and hypertrophied. The whole large bowel may be involved but more commonly one segment is primarily affected. The distal half of the colon is the usual seat of the trouble and the sigmoid is involved in over 50 per cent of the cases. The mesentery of the affected segment is markedly thickened, elongated and may be displaced medially, as occurred in our patient.

Microscopic examination of resected specimens shows hypertrophy of all layers of the bowel wall except the serosa, with the most marked changes occurring in the muscular layers. This is to be expected, for the bowel wall has been working against huge volumes of fecal material since birth and if nature had not caused an hypertrophy of its layers, it would probably have long since weakened and ruptured from the extreme dilatation and intracolic pressure.

It is interesting to note that various observers[4,6,9,20,21,23,25,32] have found similar gross and microscopic pathologic changes in cases of acquired megacolon due to definite organic obstruction, as are found in the true congenital type.

Clinical Features

The cardinal symptoms and signs in congenital megacolon are chronic constipation or rather obstipation and abdominal distention. The constipation has usually been present since birth and often becomes progressively worse. Cathartics have very little effect. The usual recourse is to frequent and large enemas, without which these patients will go from one to six weeks without a bowel movement. Attacks of abdominal pain, distention and vomiting are common. Cases have been reported where complete obstruction required emergency operation for relief. Many of these children present a typical large protuberant abdomen. Wade[33] reports the finding of peristaltic waves over the abdomen in the more severe cases but this has not been observed by most authors except in obstructed cases. Several quarts of fluid may be introduced into the bowel without any feeling of fullness or discomfort. X-ray plates taken after the administration of a barium enema show the characteristic features of a hugely dilated colon with absence of haustration (Fig. 4).

Treatment

Medical treatment for congenital megacolon is of little avail. Diet and drugs are useless. Laxatives and enemas will keep the patient fairly comfortable but are of no permanent value.

Previous to the report of Wade and Royle[34] in 1927, surgical treatment of this condition had consisted of various procedures such as partial or total colectomy, short circuiting operations such as ilio-sigmoidostomy or ileostomy, appendicostomy or colostomy for the relief of obstruction, or irrigation of the bowel. These operations, although giving some good results, carried a high mortality and in general were very unsatisfactory.

In 1924 in the course of resecting abdominal sympathetic nerves for the relief of spastic conditions of the lower extremities, Royle and Hunter observed that some of their patients were relieved of constipation. Later Royle[34] and Wade[33,34] reported favorable results obtained in Hirschsprung's disease by left lumbar ramisection. Subsequently Judd and Adson,[15,16] Rankin and Learmouth,[26,27,28] Robertson,[30] Scott,[31] Barrington-Ward,[5] Gibbens,[13] Gask and Ross[12] and others have reported a considerable group of cases in which the original operation of Royle had been amplified and modified but all based on an attack on the abdominal sympathetic nerves supplying the large bowel.

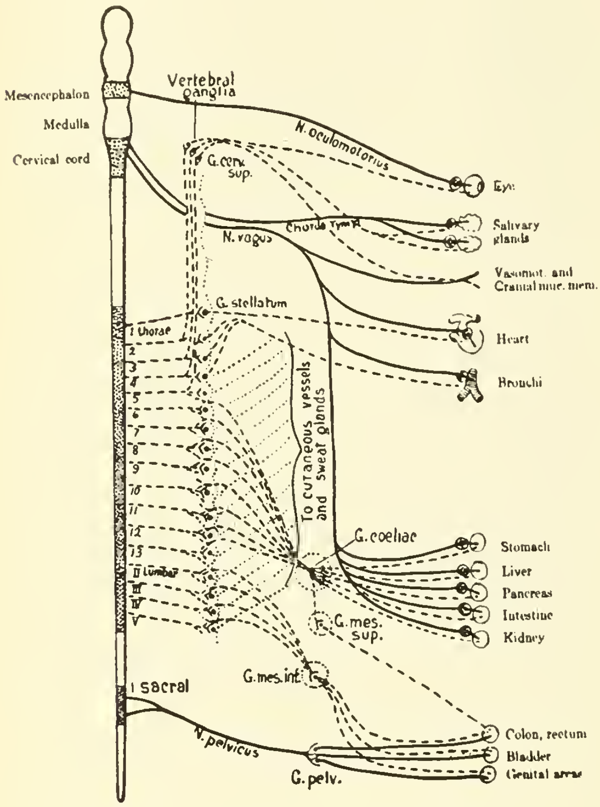

Vertebral ganglia
Mesencephalon
Medulla
Cervical cord
N. oculomotorius
G. cerv. sup.
Eye
Chorda tymp.
N. vagus
Salivary glands
Vasomot. and Cranial muc. mem.
G. stellatum
1 thorac
2
3
4
5
6
7
8
9
10
11
12
13
I lumbar
III
IV
V
To cutaneous vessels and sweat glands
Heart
Bronchi
G. coeliac
Stomach
Liver
Pancreas
Intestine
Kidney
G. mes. sup.
G. mes. inf.
1 sacral
N. pelvicus
G. pelv.
Colon, rectum
Bladder
Genital areas

Fig. 1. Autonomic nervous system. Solid black lines represent cranio-sacral (parasympathetic). Broken lines represent thoracico-lumbar (sympathetic). From Kunz: Autonomic nervous system modified from Meyer and Gottlieb.

Since the surgery of the sympathetic nervous system is not a subject with which the general surgeon is in daily contact, it may be well to review briefly some fundamentals of anatomy and physiology upon which these operations are based.

Anatomy

The sympathetic nervous system is an aggregation of ganglia, nerves and plexuses through which the viscera, glands, heart and blood vessels receive their innervation (Fig. 1). It is widely distributed throughout the body and contains fibers running to and from the spinal cord through the so-called rami communicantes.

The sympathetic trunks are two nerve cords extending vertically through the neck, thorax and abdomen, one on each side of the vertebral column. Each trunk is composed of a series of ganglia arranged in linear order and bound together by short nerve strands. They are connected with the spinal nerves through communicating rami. Each nerve trunk gives off branches which enter into the formation of the large prevertebral plexuses, i.e., the cardiac, celiac, superior mesenteric, inferior mesenteric, hypogastric and pelvic plexuses.

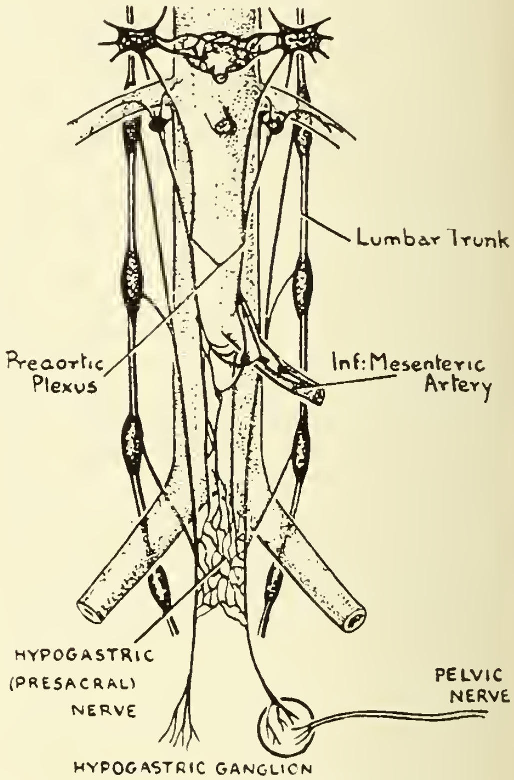

Lumbar Trunk
Preaortic Plexus
Inf: Mesenteric Artery
HYPOGASTRIC (PRESACRAL) NERVE
PELVIC NERVE
HYPOGASTRIC GANGLION

Fig. 2. Formation of lumbar splanchnic nerves, the preaortic plexus and the presacral nerve. From Gask and Ross: Surgery of the Sympathetic Nervous System.

The abdominal viscera including the colon, rectum and bladder receive their sympathetic nerve supply through the so-called thoracicolumbar division of the autonomic nervous system whose pre-ganglionic fibers are derived from the lower six thoracic and upper lumbar spinal nerves. These fibers either end in or pass through a complicated system of ganglia, part of which are the four lumbar ganglia, to reach the preaortic plexuses. Postganglionic fibers pass from the celiac plexus along the large blood vessels to supply the stomach, small intestine and first part of the colon (Fig. 1).

The aortic or intermesenteric plexus is a group of nerve fibers surrounding the front and sides of the aorta below the origin of the superior mesenteric artery. It is composed of nerves which run downwards from the celiac ganglia with the addition of similar splanchnic branches which pass inwards from the lumbar sympathetic trunk on each side (Fig. 2).

Just below the origin of the inferior mesenteric artery two or more fairly distinct nerve trunks leave the aortic plexus to join together close to the wall of the inferior mesenteric artery. These give rise to the inferior mesenteric plexus, branches of which follow the course of the artery and supply the distal half of the colon and upper rectum.

The lower rectum, bladder and uterus receive their sympathetic nerve supply by way of the presacral nerve (hypogastric plexus) (Fig. 2). The presacral nerve is usually a network of fibers lying on the anterior surface of the body of the fifth lumbar vertebra just below the bifurcation of the aorta between the origin of the two common iliac arteries. It has three roots. One root on either side is derived from branches of the four lumbar ganglia. The central root is the termination of the aortic (intermesenteric) plexus. The presacral nerve descends into the pelvis, divides into two hypogastric nerves which end in the hypogastric ganglia (pelvic plexus) along the lateral wall of the rectum to supply the bladder, lower part of the rectum and internal sphincter of the anus. The pelvic plexus also receives the sacral autonomic fibers.

There are usually four lumbar ganglia on each side. They are situated on the antero-lateral surface of the bodies of the lumbar vertebræ just medial to the psoas muscle. The first ganglion is located just posterior and inferior to the origin of the renal artery and the fourth ganglion is situated over the brim of the pelvis posterior to the origin of the common iliac artery on each side. Some branches are given off to join the inferior mesenteric plexus and others form the lateral cords of the hypogastric or presacral nerve.

Physiology

From a functional point of view, the involuntary or autonomic nervous system is divided into two parts (Fig. 1). The thoracicolumbar autonomic nervous system commonly called the sympathetic nervous system has just been described. The second division is the craniosacral autonomic or parasympathetic nervous system. The latter is composed of preganglionic fibers in the 3rd, 7th, 9th, 10th and 11th cranial nerves and visceral rami of the 2nd, 3rd and 4th sacral nerves. These fibers have no connection with the sympathetic trunks but run direct to sympathetic plexuses and end in terminal glanglia. The parasympathetic system supplies fibers to the proximal part of the colon through the vagus and to the distal portion of the colon and rectum through the sacral nerves.

The sympathetic and parasympathetic nerves are antagonistic in action. It is generally accepted that the sympathetic nerves are inhibitors of muscular contraction in the bowel wall and contractors of the sphincters. In opposition to them, the parasympathetic nerves cause contraction of the wall and relaxation of the sphincters. Normally they maintain a functional balance and tone in the smooth muscle of the intestine which may be compared to the reciprocal action of two cerebro-spinal nerves which supply a group of flexor and extensor muscles acting on a given joint. Learmouth and Markowitz[18,19] have shown in experiments on dogs that stimulation of the roots of the inferior mesenteric ganglion (sympathetic nerves) causes a relaxation of the bowel and contraction of the internal sphincter ani. Section of these nerves caused an immediate increase in intracolic pressure.

On the basis of these anatomic and physiologic facts therefore, it is reasonable to expect that in a hugely dilated inactive colon, whether it be due to an overactivity of the sympathetic nerves, a dysfunction of the coördinating mechanism or overstimualtion of the sphincters, if the sympathetic nerve supply is severed, thus allowing an unimpeded action of the parasympathetic nerves, contraction and increased activity of the bowel wall should occur. That this does follow is attested to by the number of reports in the literature in the past ten years on the beneficial effects of sympathectomy for the relief of these conditions.

Operative Procedures

As previously mentioned, ramisection for the treatment of megacolon was first suggested by Royle,[34] who noticed a relief from constipation in some of his patients upon whom he had performed a left lumbar ramisection for spastic conditions of the lower extremities. Wade[33] at the suggestion of Royle applied this operation in thirteen cases of megacolon and reported good results in the majority of cases. He divided the white ramus of the first lumbar nerve on the left side, all the mesial branches of the lumbar chain and also the trunk itself below the fourth ganglion. These authors used a lumbar incision and retroperitoneal approach. Judd[16] and Adson[1,3] extended the operation, excising the second, third and fourth lumbar ganglia and main sympathetic trunk and cutting all communicating fibers on one or both sides, depending upon how much of the colon was involved. Adson uses a transperitoneal approach (Fig. 3). The abdomen is opened through a midline incision extending around and above the umbilicus. The intestines are packed upward. For resection at the left lumbar chain, an incision is made through the posterior parietal peritoneum just lateral to the junction of the descending colon and sigmoid. This portion of the bowel with its mesentery and blood supply is elevated and reflected medially to the midline. The left lumbar trunk and ganglia are exposed as they lie on the bodies of the lumbar vertebræ between the medial border of the psoas muscle and the abdominal aorta. The ganglia on the right side are exposed through a second incision in the posterior peritoneum just to the right of the aorta and without reflecting the colon. On the right side the inferior vena cava is encountered and must be retracted medially.

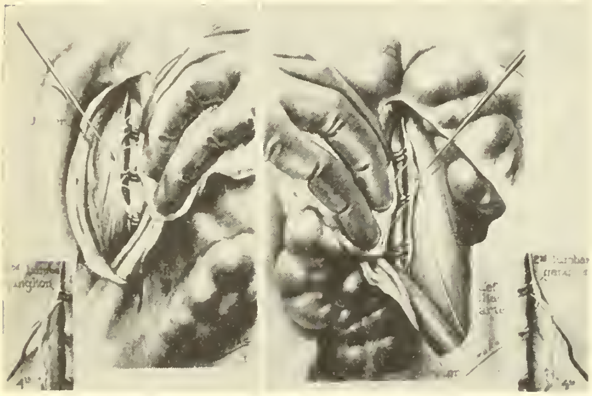


Fig. 3. *(Left)* Transperitoneal approach to right ganglionated trunk (Adson). *(Right)* Transperitoneal approach to left ganglionated trunk (Adson).

Rankin and Learmouth[27,28] originated another operation which they felt was a more direct and complete attack on the problem (Fig. 2). They first divide and remove the presacral nerve by which inhibitory fibers to the rectum and motor fibers to the internal sphincter are removed. They then divide and remove sections of the inferior mesenteric nerves through which inhibitory impulses are conveyed to the descending colon, sigmoid and upper rectum. They thus deprive of its sympathetic nerve supply the portions of the bowel chiefly affected without sacrificing the vasomotor supply to the lower extremities. The technic of their operation we will quote:

> "Since the inferior mesenteric artery arises opposite the third lumbar vertebra, and the presacral nerve is to be found in front of the fifth lumbar vertebra, full exposure of these structures may be obtained through a left paramedian incision 15 centimeters long, and centered on the umbilicus. The small bowel is packed off upward and to the right, so as to expose and pull upward the root of its mesentery; the attachment of the mesentery to the posterior abdominal wall is above the field of operation, save when the bifurcation of the abdominal aorta is unusually high. An assistant draws the sigmoid colon to the left and slightly downward, to expose the bifurcation of the aorta. In rare cases the root of the mesosigmoid may be displaced medially, in front of the fifth lumbar vertebra, when it must be mobilized by division of the right leaf of its peritoneum. The promontory of the sacrum is now identified, and in most cases it is possible to see the strands of the presacral nerve as they descend in the middle line, immediately under the peritoneum. The peritoneum is picked up in the midline, and is incised vertically from the level of the promontory to the origin of the inferior mesenteric artery. The strands of the presacral nerve are not adherent to the membrane, and posteriorly they are separated from the great vessels by a layer of thin connective tissue. The nerve is first divided below, at the right border of the left common iliac vein. It is then raised by gentle dissection and the branches which reach it from the fourth lumbar ganglia are divided on each side. Immediately below the bifurcation of the aorta, the connecting branches from the third lumbar ganglia are divided as they pass to join the nerve from beneath the common iliac arteries. When the nerve is raised a little higher, its lateral roots, formed by the union of branches from the first and second lumbar ganglia, may be severed; the middle root is preserved if possible, to be used as a guide to the intermesenteric plexus. The trunk of the inferior mesenteric artery is now identified by tracing upward the middle root of the presacral nerve; the operator reaches the two large principal roots of the inferior mesenteric plexus, one on each side of the vessel, and joining it 1.5 centimeters below its origin.

They are large and easily isolated. About 2.5 centimeters of each are resected. Any subsidiary periarterial strands are then sought for and, if found, they are divided. The incision in the posterior peritoneum is now brought together with a continuous suture of catgut, and the abdominal wound closed in the usual manner."

In order to determine which of these various types of sympathectomy should be employed in any given case of megacolon, consideration must be given to the extent and degree of the disease; the more widespread and advanced the process, the more complete must be the resection of the sympathetic fibers. Good results have been reported in a fair number of cases by advocates of each one of these procedures. Influenced by some unsatisfactory results in advanced cases of Hirschsprung's disease, Adson[2] and Craig[7,8] have enlarged the scope of the operation to include resection of both lumbar trunks, including the second, third and fourth lumbar ganglia, with wide resection of the superior hypogastric plexus (presacral nerve) in certain cases. No serious untoward results have been observed as a result of these operations. Vasodilatation and dryness of the skin of the leg and foot occurs as a result of glanglionectomy and trunk resection. In men, presacral neurectomy paralyzes the mechanism of ejaculation but does not disturb the libido and potentia. Slight frequency of micturition may occur.

Case Report

The patient is a young lady twenty-two years of age who was first seen by us in October, 1932. Her mother is suffering from a mild case of Raynaud's disease. At birth, this patient was burned on the buttocks and around the anus with a hot iron. The burn healed in three or four months. The baby apparently had normal bowel movements until about six months of age, *i.e.*, until the burn had healed and scar tissue had formed. Since that time she has had increasing constipation, going for several days up to as much as three weeks without an evacuation unless enemas were given. Laxatives had little effect. Throughout childhood the mother kept the child in fair condition by frequent large enemas. At the age of seven years, she was examined at the Mayo Clinic. An anal stricture was found which was thought to be due to the burn sustained in infancy. The anal ring was so small that it would admit only the tip of the little finger. No colon x-ray was done at that time. Dr. Judd incised the scar tissue and dilated the rectal sphincter. This operation caused no improvement in her constipation, which grew gradually and progressively worse as she advanced in years. During the two or three years immediately preceding our first observation (1932) she had several attacks of obstruction with abdominal pain, distention and vomiting which required hospitalization and high colonic flushes to relieve the bowel of large accumulations of feces. During all this period and in spite of her inability to have a normal defecation she had a partial rectal incontinence. Small amounts of fecal material would constantly exude without her knowledge or control, necessitating the wearing of a napkin continuously. She had a few attacks of urinary retention with a distended bladder which required catheterization for relief. Otherwise her general health was fair.

Physical examination in October, 1932, showed a fairly well nourished girl, twenty years of age, and weighing about 110 pounds. Examination of the heart, lungs, urine and blood was negative. The abdomen was soft and slightly larger than normal. Large hard movable masses (colon filled with feces) were easily palpable throughout the abdomen. There was a large scar on the buttocks six inches in diameter and involving the posterior margin of the anus. This scar was soft and pliable and did not appear to involve the deeper tissues. The anus admitted the index finger easily with no obstruction demonstrable.

After cleansing enemas, a proctoscopic examination was done. Immediately after passing the anus the instrument entered a hugely dilated rectum fully five inches in diameter. It was passed directly cephalad thirty centimeters into the sigmoid without observing any change in the diameter of the gut or causing any discomfort to the patient. The mucous membrane was pale and smooth and the rectal valves were reduced to low ridges.

On October 24, 1932, a colon x-ray was taken after the administration of a barium enema which was reported by Dr. Leo Rigler as follows: "There is enormous distention of the rectum and of the sigmoid. The latter is extremely long and extends well up to the left diaphragm. Marked redundancy and extreme width of this whole portion of the colon is present. The descending, transverse and ascending colon are not so large although they may be slightly dilated. Marked compression of the ascending colon is present from the tremendously dilated sigmoid. The whole appearance suggests Hirschsprung's disease or megacolon." There was also a characteristic absence of normal haustration (Figs. 4 and 5).

January 14, 1933, a second barium enema was given and the patient observed under the fluoroscopic screen. The same conditions were present and no peristaltic waves were visible in the sigmoid or rectum. While the barium was retained, a spinal anesthesia was administered by injecting 100 milligrams of novocain and the appearance of the colon again observed under the fluoroscope. A marked change occurred. Deep peristaltic waves were visible in the lower sigmoid, extending into the rectal ampulla, with marked contraction to the colon. This experiment satisfied us that sympathectomy could be expected to produce the desired results and we therefore advised operation. Because the disease was localized almost entirely to the sigmoid colon and rectum, we intended to perform a presacral and inferior mesenteric neurectomy as advocated by Rankin and Learmouth.

Operation was performed at Northwestern Hospital June 22, 1933, after several days preoperative preparation with cleansing enemas and a low residue, high caloric diet. Spinal anesthesia reinforced with ethylene was used. The abdomen was opened through a low midline incision extending around and two inches above the umbilicus. The rectum was hugely dilated and filled the pelvis. In spite of the preoperative preparation it was still filled with feces. The uterus, tubes and ovaries were displaced up into the abdomen by the large rectum. The dilatation continued throughout the sigmoid, which was very redundant and extended vertically up to the diaphragm and then doubled back on itself to fill most of the abdomen. The mesorectum and mesosigmoid were very much thickened and were displaced medially so that they seemed to spring from the midline. The walls of the sigmoid and rectum were markedly thickened. The descending, transverse and ascending colon appeared normal in position and size. We first attempted to locate and resect the presacral nerve by making a vertical incision in the posterior peritoneum in the midline over the promontory of the sacrum. However, because the rectum extended so high and the mesosigmoid was attached so close to the midline, we were not able to obtain a satisfactory exposure of this region without endangering the blood supply to the sigmoid. Therefore we changed our operative attack, incised the posterior parietal peritoneum just lateral to the lower end of the descending colon and reflected the sigmoid with its blood supply and the left ureter medially, exposing the left lumbar gangliornated trunk. The left lumbar trunk and second, third and fourth ganglia were removed and all communicating branches severed. The incisions in the posterior peritoneum were sutured with plain catgut and the wound closed by layers (Fig. 3).

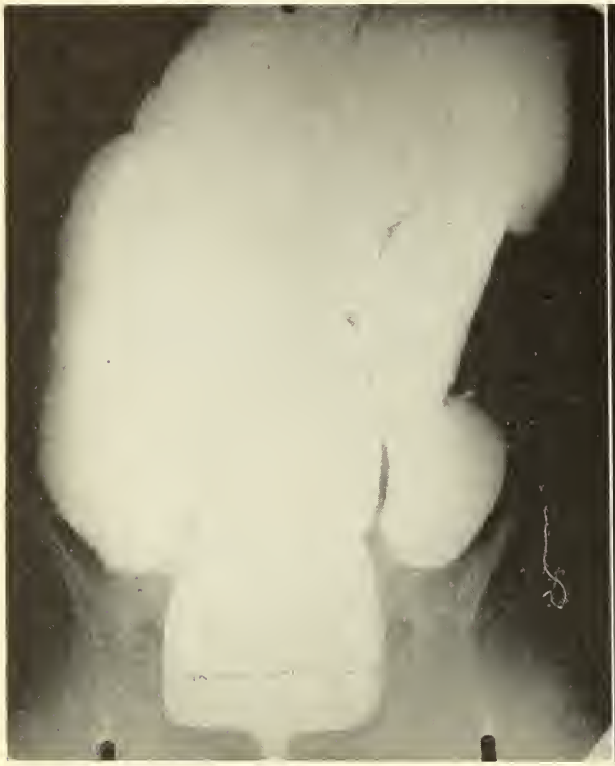


Fig. 4. Megacolon in female, twenty years of age. Colon x-ray after barium enema October 24, 1932, before operation. Note enormous distention of rectum and sigmoid. Absence of normal haustration. Sigmoid is very redundant and extends well up to the left diaphragm.

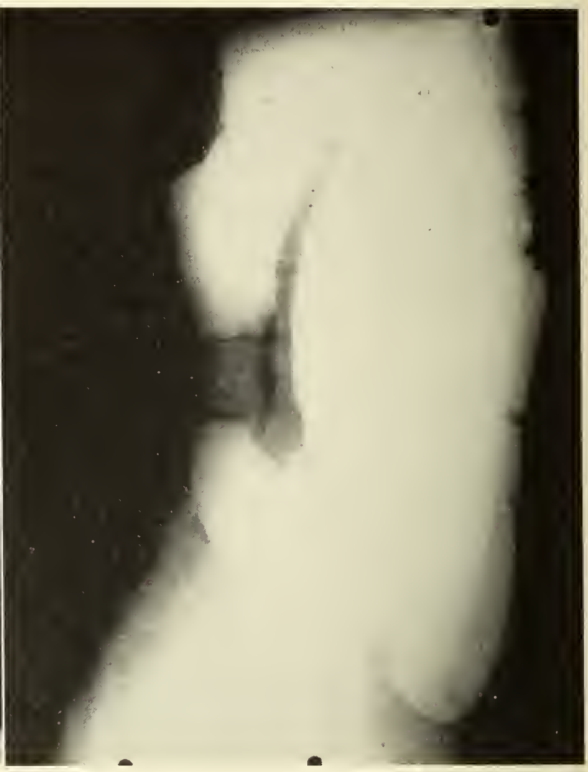


Fig. 5. Lateral view of Figure 4.

The immediate postoperative reaction was fairly severe, with the temperature rising to 103 degrees and pulse to 130 beats per minute during the first two days, after which, convalescence was uneventful. Enemas were given daily beginning on the third postoperative day and the patient left the hospital on the sixteenth day. She had a normal bowel movement on the fourteenth day. She was advised to take mineral oil and a mild laxative as necessary to ensure a daily evacuation, and to begin to train herself in regular bowel habits. Six weeks after the operation she reported as follows: "It is with pleasure that I make a favorable report to you. Since leaving Minneapolis I have not had to take an enema. Also I have been able to decrease the amount of mineral oil and milk of magnesia taken. During my first week at home my stools were formed, but quite soft. Later they became watery and since then have become harder and more formed. I have no difficulty in controlling the movements. I have no masses in my abdomen as I did before the operation. I am feeling fine. May I go swimming?"

She was reexamined on May 24, 1934, eleven months postoperative, when a colon x-ray (Fig. 6) showed the sigmoid and most of the rectum to be reduced to normal size with good haustral markings present. There was considerable redundancy of the sigmoid and slight dilatation of the rectal ampulla remaining. She was examined again only a few days ago, twenty-one months postoperative, but we were unable to obtain a colon ray. This will be done later. Her bowel movements are satisfactory although she says she has been getting careless and frequently goes two days without an evacuation. She has taken no laxatives or enemas for the past six months. She states that the incontinence which she had before the operation has practically disappeared. Her abdomen is normal and no masses are palpable. The skin of her left foot is more dry and scaly than that of the right foot and the skin temperature of the left leg is three-tenths of a degree higher than that of the right leg.

This patient presents several unusual features about which it is interesting to speculate. The question at once arises, is this a true congenital megacolon with the anal stricture merely a coincident feature? Or was the child normal at birth and the dilatation of the colon the direct result of the traumatic stricture of the anus? The parents state very definitely that there was no difficulty with the bowels until after the burn had healed. If the latter is true, the mechanical obstruction during the first six and one-half years of life must have so disturbed the neuro-muscular mechanism of the bowel that the relief from the mechanical obstruction at seven years of age did not inhibit the progress of the disease. In any event, she presented most of the essential characteristics of the congenital type of megacolon and has received very satisfactory results from left lumbar trunk resection and ganglionectomy.

Another unusual and interesting feature of this case is the improvement in the rectal incontinence which has taken place since the sympathectomy. From a physiologic standpoint, since the sympathetic nerves are contractors of the sphincters, one would expect an aggravation of the incontinence after sectioning these nerves. However, this did not occur. Our explanation of the improvement in control is that the external sphincter ani muscle, which is partially under the control of the voluntary nervous system, was weakened as a result of the incision of the anal stricture when the child was seven years of age. This partially incompetent external sphincter was not able to support the weight of the huge masses of fecal material retained above. Sympathectomy has reduced the bowel content to normal so that the same sphincter is now able to control the movements.

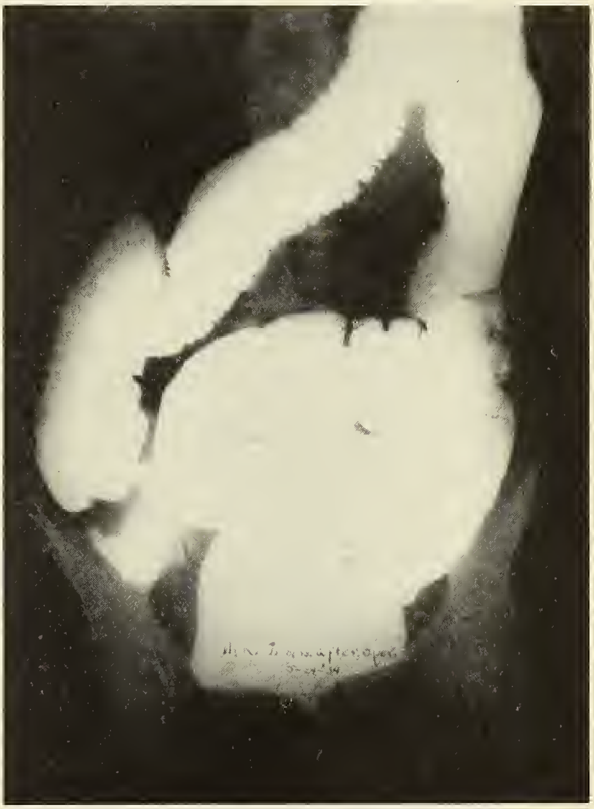


Fig. 6. Same patient eleven months after left lumbar ganglionectomy and ramisection. Note reduction in size of rectum and sigmoid to normal. Good haustral markings present. Sigmoid is still redundant and slight dilatation of the rectal ampulla remains.

Summary

Megacolon is a term used to describe any dilated, hypertrophied colon. It may be either congenital or acquired. Congenital, idiopathic megacolon (Hirschsprung's disease) is a clinical entity usually seen in infancy or early childhood. It is characterized by a hugely dilated hypertrophied colon with marked obstipation and abdominal distention. It is considered to be of neurogenic origin although the exact etiological factors are unknown. Medical and surgical treatment have been unsatisfactory until the advent of a method of surgical attack upon the sympathetic nervous system.

Various operative procedures on the abdominal sympathetic nerves have been developed for the treatment of this disease, the object of which is to remove the sympathetic nerves which supply the portion of the bowel chiefly affected. All of these operations are based on the fairly well established physiological principle that the sympathetic nerves are inhibitors of the smooth muscle of the bowel wall and contractors of the internal sphincter muscles. Overactivity of these nerves causes dilatation of the bowel and contraction of the sphincters. Sufficient experimental and clinical evidence has been offered to prove the value of sympathetic nerve resection in properly selected cases of megacolon.

A case is reported of a girl twenty-two years of age with a hugely dilated rectum and sigmoid colon filling the entire abdomen, in whom we resected the left lumbar sympathetic trunk and ganglia twenty-one months ago. Very satisfactory results have been obtained in this case as demonstrated by clinical improvement and x-ray plates taken after a barium enema. This patient had most of the classical features of a typical congenital megacolon (Hirschsprung's disease), but had the additional element of a traumatic anal stricture developing at six months of age. This was incised and the stricture apparently relieved (at seven years of age) without inhibiting the further progress of the disease. We believe, therefore, that this must be considered as a case of acquired megacolon due to obstruction from a traumatic anal stricture resulting from a burn sustained soon after birth. The mechanical obstruction, which was present for six and one-half years, apparently caused such an interference with the neuro-muscular mechanism of the bowel that the latter continued in a state of increasing imbalance for thirteen and one-half years after the mechanical obstruction had been relieved. Restoration of normal bowel function has been obtained by left lumbar sympathectomy after twenty years of dysfunction.

Bibliography

1. Adson, A. W.: Ramisection for spastic paralysis. Surg. Clinics of No. Amer., 5:777-789, 1925.
2. Adson, A. W.: Hirschsprung's disease: Report of cases in which relief was obtained by sympathectomy. Proc. Inter-State Post. Grad. Assembly of North Amer., 1933, pp. 114-120.
3. Adson, A. W., and Brown, G. E.: The treatment of Raynaud's disease by resection of the upper thoracic and lumbar sympathetic ganglia and trunks. Surg., Gynec. and Obst., 48:577-603, 1929.
4. Bailey, Fred Warren: Congenito-mechanical dilatation of colon. Imperforate anus. Jour. Mo. St. Med. Assn., 10:12, (Aug.) 1914.
5. Barrington-Ward, L. E.: Abdominal sympathectomy for Hirschsprung's disease. Proc. Roy. Soc. Med., 25:1221-1225, 1932.
6. Brenneman, J.: Simple congenital anorectal stricture with megacolon in early infancy—six cases. Jour. Am. Med. Assn., 89:662-666, (Aug. 27) 1927.
7. Craig, W. McK.: Surgery of sympathetic nervous system. Jour. Michigan Med. Soc., 30:814-820, (Nov.) 1931.
8. Craig, W. McK.: Resection of presacral sympathetic nerves: its clinical application. Surg. Clin. N. Am., 14:673-683, (June) 1934.
9. David, Vernon C.: Congenital rectal stricture as a cause of infantile megacolon. Surg., Gynec. and Obstet., 37:197-201, 1923.
10. Frankl-Hochwart, L. and A.: Froelich: Pfluger's Arch., 81:420, 1900.
11. Gant, S. G.: Diseases of rectum, anus and colon. W. B. Saunders Company, Philadelphia, 1923, pp. 111, 303.
12. Gask, G. E., and Ross, J. P.: Surgery of the sympathetic nervous system. Wm. Wood & Co., 1934.
13. Gibbens, John H.: Hirschsprung's disease treated by excision of the inferior mesenteric ganglion. Roy. Soc. Med. Proceedings, 25:1225, 1932.
14. Hirschsprung. Jahet F. Kinderheilk, 27:1, 1888.
15. Judd, E. S., and Adson, A. W.: Lumbar sympathetic ganglionectomy and ramisectomy for congenital idiopathic dilatation of the colon. Trans. Amer. Surg. Assn., 46:150-178, 1928.
16. Judd, E. S., and Adson, A. W.: Lumbar sympathetic ganglionectomy and ramisectomy for congenital idiopathic dilatation of colon. Ann. Surg., 88: 479-498, 1928.
17. Lake, Norman C., and Marshall, C. J.: Surgical anatomy and physiology. London. H. K. Lewis and Co., 1934.
18. Learmouth, J. R., and Markowitz, J.: Studies on the function of the lumbar sympathetic outflow. Amer. Jour. Physiol., 89:686, 1929.
19. Learmouth, J. R., and Markowitz, J.: Studies on the innervation of the large bowel. Amer. Jour. Physiol., 94:501-504, 1930.
20. Lefevre and Jonchires: Chronic occlusion of colon simulating megacolon in cancer of sigmoid. Bull. et mem. Soc. de Med. et Chir. de Bordeaux, pp. 282-286, 1926.
21. Lockhart-Mummery, J. P.: Case of megacolon with secondary carcinoma. Proc. Roy. Soc. Med. London, Sec. Surg., 12:44, 1918-19.
22. Lockhart-Mummery, J. P.: Diseases of rectum and colon. Bailliere, Tindal and Cox. London, 1923, pp. 142-144.
23. Macaige and Fleury, J.: Dilatation of colon due to tumor pressure of rectum. Bull. et mem. Soc. med. d. hop. de Paris, 52:1113-1115, (July 5) 1928.

24. Magoun, J. A. H., Jr.: Dilatation of the colon simulating Hirschsprung's disease. Surg., Gynec. and Obst., 34:198-200 (Feb.) 1922.
25. Rankin, F. W.: Dilatation of colon secondary to cancer of sigmoid. Surg. Clin. No. Am., 9:863-874, (Aug.) 1929.
26. Rankin, F. W., and Learmouth, J. R.: Section of the sympathetic nerves of the distal part of the colon and the rectum in the treatment of Hirschsprung's disease and certain types of constipation. Trans. Amer. Surg. Assn, 48:279-289, 1930.
27. Rankin, F. W., and Learmouth, J. R.: Present status of treatment of Hirschsprung's disease. Am. J. Surg., 15:219-227, 1932.
28. Rankin, F. W., and Learmouth, J. R.: Section of the sympathetic nerves of the distal part of colon and the rectum in the treatment of Hirschsprung's disease and certain types of constipation. Ann. Surg., 92:710-720, 1930.
29. Ranson, S. W. The anatomy of the nervous system. W. B. Saunders, p. 334, 1923.
30. Robertson, D. E.: Sympathectomy for megacolon. Canadian Med. Jour., 24:359-364, (Mar.) 1931.
31. Scott, W. J. M.: Discussion: Splanchnic anesthesia in ileus. Trans. Amer. Surg. Assn., 48:278, 1930.
32. Shelly, Harold J.: Acquired megacolon. Ann. Surg., 93:910-914, 1931.
33. Wade, R. B.: Left lumbar ramisection in Hirschsprung's disease. Lancet, 218:136-137, 1930.
34. Wade, R. B., and Royle, N. D.: Operative treatment of Hirschsprung's disease. Med. Jour. Australia, 1:137-141, 1927.

ANAL ABSCESS AND ANAL FISTULA*

HARRY W. CHRISTIANSON, M.D.
Assistant in Surgery, University of Minnesota
Minneapolis

BEFORE discussing the subject of anal abscess and anal fistula I would like to recall, briefly, the anatomy of some of the structures which are of importance in this discussion.

The dentate margin or the pectinate line is about 0.5 to 2 cm. from the anal margin and it is formed by the fusion of the proctodeum and the hindgut. In the adult it marks the junction of the mucous membrane and the skin. This landmark is easily distinguished by the numerous, tiny, skin covered projections known as the anal papillæ. This line derives its name from the tooth-like appearance of the papillæ. The crypts and columns are in close approximation to the papillæ. Crypts are small pockets with microscopic sinuses around which a small amount of lymphoid tissue is found. The dentate margin and crypts furnish the only anatomical reason for the frequent occurrence of abscesses and fistulæ. The crypts are susceptible to injury from the passage of a large hard stool or by the passage or imbedding of a foreign body such as a seed, a fishbone, a toothpick or any other firm object. A crypt is almost invariably the original site of the infection. This infection progresses by burrowing, most frequently, either laterally, medially or through the external sphincter muscle and subsequently it forms an abscess. It is because of the presence of an abscess that the patient first seeks relief. Prior to this a little discomfort may have been noted but it is usually of too little consequence to warrant the consulting of a physician or even to be recalled by the patient after the abscess has developed. Such an abscess may rupture spontaneously or it may be incised. This latter event, in the course of the inflammatory process, completes the formation of a fistula. Occasionally the abscess develops lateral to the rectal wall, rupturing into the rectum above the anus, and under such circumstances there may be no external opening. For this reason, Buie, a few years ago, substituted the name "primary opening" to replace the term "internal opening" and also "secondary opening" instead of "external opening."

A recent review of one thousand fistulectomies† showed that 58.9 per cent of the patients were males and 41.1 per cent were females. One patient was less than ten years of age and six were in the second decade of life. Some 77.4 per cent were between the ages of twenty and fifty years and 16.5 per cent between fifty and sixty. (Since this review I have operated on a baby, ten months old, who had an anal fistula with two secondary openings, externally.) Tuberculous tissue was found in only 2.2 per cent of the cases. There were, however, five patients with active tuberculosis who had had fistulectomies performed, but examination of the tissue removed at the time of the operation failed to reveal a tuberculous infection. Ninety-one or 9.1 per cent of the thousand patients showed roentgenographic evidence of either having tuberculosis at the time of the operation or having had it previously.

---

*Presented before the Hennepin County Medical Society, January 16, 1935.

†Review undertaken while on a fellowship at The Mayo Clinic, Rochester, Minnesota.

The treatment of this inflammatory process naturally divides itself into two stages, namely, the abscess and the fistula. The discomfort of the abscess is either relieved by its spontaneous rupture or by surgical incision. It is a good policy never to open an abscess until it "points" or until there is definite superficial fluctuation. It is advisable to apply hot moist packs to assist nature in localizing the infection, or in other words, assist the "walling off" process if an abscess is seen before fluctuation can be elicited. The incision, when necessary, should be ample to permit free drainage of the abscess cavity. If the abscess is lateral to the rectal wall it is advisable to drain the cavity externally if possible. A digital examination of the abscess cavity, after incision, should be made very carefully because there is a definite hazard of spreading the infection and also because there is the possibility of causing the patient a great deal of unnecessary pain. It is important that there should be adequate drainage of the abscess cavity at all times. Such drainage is readily enhanced by the application of hot moist dressings and occasionally by the insertion of a small wick of gauze or a rubber tissue drain. It is folly to try to prevent the formation of a fistula by firmly packing the abscess cavity with gauze. It is true that, on very rare occasions, an abscess cavity may heal spontaneously. This result cannot be attributed to packing the cavity. The explanation of such spontaneous healing of an abscess may be ascribed to the fact that when the pressure from the infection has been relieved distally the sphincter muscle contracts upon the sinus and sufficient fibrosis takes place to obliterate the tract and the crypt, thus shutting off the source of the infection.

The surgeon will do well to inform the patient with an anal abscess that the incising of the abscess is merely done to palliate the condition and to protect him against further inroads from the infection; that later he will undoubtedly require a second operation to actually cure the fistula. If this explanation is made at the time the abscess is incised the surgeon may avoid considerable embarrassment later and perhaps save his reputation with the patient because, otherwise, patients are prone to believe that the first operation was a failure.

If sufficient time is permitted to elapse between the first incision and the fistulectomy the abscess cavity will frequently contract to a small fibrous sinus and thus necessitate a much less extensive operation.

The treatment of anal fistulæ has been discussed ever since the history of medicine has been recorded. The ancient Egyptians taught the use of the seton in the treatment of this condition. They employed hairs from a horse's tail, copper wire, etc. One of the first complete treatises on anal fistula was written by Arderne in 1376. In this treatise he recalls a Dr. Albucassis, who died in 1013, and who taught his students that usually a fistula in ano was incurable; however, Albucassis advised that the best method to treat these conditions was to place a copper wire or iron probe from the outside into the rectum and cut it wide open until the probe fell out. Albucassis used the cautery to stop bleeding and also advocated the use of the seton in the treatment of an anal fistula. The seton was tightened on the second or third day and as often thereafter as was found necessary in order that eventually the seton would cut its way out. John Arderne taught that the best way to cure a fistula was to get it out in its entirety but not to apply the cautery or caustics to the wound. He advised that in the case of numerous external openings it was necessary to find the primary tract and to excise it and that following this procedure most of the secondary tracts would heal without further treatment. He also advocated a careful postoperative régime, advising against the use of drastic purgatives, using saline enemas in their place. He washed the wound frequently with tepid water and applied a mixture of Oil of Roses and the white of an egg. The present treatment of anal fistula is not far removed from that taught by Arderne in the fourteenth century. The frequent recurrences following fistulectomies have doubtless caused many surgeons now, as well as centuries ago, to feel that usually a fistula requires more than one operation to insure a cure. In reviewing the thousand cases previously mentioned it would seem that this opinion is not unfounded, for some of these patients had had as many as fifteen or even seventeen operations by, perhaps, as many different surgeons, before a cure had been effected.

If the etiology of an anal fistula were thoroughly understood there is reason to believe that the number of failures would be noticeably decreased. There is an axiom which holds true in every anal fistula, namely, that every fistula must have a primary opening, and unless this is irradicated the fistula will undoubtedly recur. There may be more than one secondary opening externally and there may be more than one internal opening but the infection originated in the one primary opening at the dentate margin and unless this is eradicated, as stated before, the operation will not be successful.

In the review, previously mentioned, we found that 70 per cent of the primary openings were in the median line of the posterior anal wall and 20 per cent were in the anterior wall. To facilitate the finding of the primary opening, a suggestion was made some years ago and, while it is not infallible, nevertheless, it is quite helpful. If an imaginary line be drawn through the tuberosities of the ischia it will divide the anus into two halves, anterior and posterior, and all of the external openings posterior to this line will have their primary openings in the posterior quadrant and all of the external openings anterior to it would have their primary openings in a straight line extending radially into the anterior half. A few years ago Dr. N. D. Smith demonstrated, to my satisfaction, a simple method enabling one to locate the primary opening. The distal edge of the external or secondary opening is grasped with forceps and upon applying traction the primary opening may be seen to move coincidently with the traction on the secondary opening, the anal margin remaining fixed. The explanation for this phenomenon is that the fibrous tract connecting the openings is usually so firm that if one is moved the other must respond, thus indicating the site of the primary infection. This rule is more applicable in short sinus tracts. Occasionally free pus may be seen exuding from the involved crypt or, sometimes, a little granulation tissue may be noticed in the crypt or a grossly evident inflammatory reaction may be seen surrounding the infected crypt. Usually if the above rules and findings are kept in mind, it is not difficult to locate the primary opening.

The use of dyes, bismuth paste or barium is not only unnecessary but may, in fact, hinder the effort to obtain a satisfactory result. The fibrous tissue forming the tracts differs materially from normal tissue and can be identified readily. If a dye is used it may be spilled accidentally into the normal tissues and the differentiation of the normal tissues from the fibrous tissue which forms the tract becomes impossible, or there may be several tracts, one of them being larger in diameter and so direct that the dye will be forced into this one tract; the other tracts may, then, be easily overlooked. It is advisable to probe a tract from the primary opening because if a probe is passed from the secondary or external opening there is a greater danger of causing a false passage; however, if the tracts are very angular or tortuous it may be necessary to probe from both openings. The fistulous tract is incised over the probe and the overhanging edges removed. The distal end of tracts extending out a considerable distance from the anus may be sutured to obtain primary union, but care should be exercised to insure a sulcus extending a sufficient distance from the anal edge to permit free drainage of secretions and discharges from the anus. Primary closure of the tracts too close to the anal margin frequently results in a recurrence of the fistula. If a blind tract is found lateral to the wall of the bowel it is only necessary to dilate the distal end of this tract to insure ample drainage. It will gradually fill up with granulation tissue, provided the primary opening has been eradicated. The wound should not be firmly packed with gauze nor should the dressing, placed in the wound at the conclusion of the operation, be permitted to remain in the wound more than a few days. A cotton dressing should be applied after the gauze dressing has been removed and this should be changed many times a day. If tuberculous infection is suspected or if it is known to be present it is not necessary to cauterize the wound because a tuberculous fistula can be treated in the same manner as a non-tuberculous tract and the wound will heal almost as quickly as one due to any other infection. It may be necessary to incise the sphincter muscle more than once, depending on the number of times the tracts pass through or lateral to it.

The most satisfactory position for obtaining good exposure of the operative field during a fistulectomy is to place the patient in a ventral prone position with the hips elevated by means of a kidney rest. A similar position was advanced by Aderne and after many centuries of disuse it has been found to be the most suitable one for all rectal work.

It is important to have complete relaxation of the sphincter muscle during the operation and for this reason a sacral and caudal anesthetic is the most satisfactory because it not only fulfils this requirement but it is usually not accompanied by any of the common "anesthetic dangers."

The postoperative treatment is just as important as the operative technic. In fact, they are usually so comparable in value that careless postoperative treatment may precipitate disastrous results even after a most skilfully performed and thorough operation. Hot moist packs should be applied postoperatively to relieve pain and to stimulate healing. The wounds should be gently cleansed every day with a mild antiseptic and the tissues prevented from bridging across the sulcus. The diet should consist of foods which will leave ample bulk for the formation of a large stool which will act as nature's own dilator to insure an anal canal of normal diameter. Purgatives or oils should not be used postoperatively as they may cause leakage of bowel secretions and thus keep the area bathed in infective material. If this postoperative treatment is properly accomplished the scar tissue will be reduced to a minimum and it will be pliable. The block of scar tissue formed in the sphincter muscle as the result of this type of postoperative treatment will contract to a very narrow band and the fibres will function almost as satisfactorily as if the fibres were intact. Usually the result obtained from the continuous firm packing of the cavity with gauze will be a fixed fibrous membrane with a depressed scar. This will cause poor control of the sphincter muscle with leakage of mucus and feces.

PATHOLOGIC CONDITIONS IN THE NEWBORN*

THOMAS MYERS, M.D.

Saint Paul

DURING the past few decades, a marked decrease in mortality from infancy to early adult life has been effected. This is particularly apparent during the first few years of life, and is responsible to a considerable degree for our steadily decreasing death rate. Such improvement, however, does not appear during the early days of life, and mortality in the newborn has decreased but little, in contrast with that in infants over one month of age. Having survived the first weeks of life, the infant of today stands an excellent chance of growing to maturity; but the fateful days immediately following birth are laden with almost as much disaster today, as of a generation ago.

TABLE I. INFANT DEATH RATE (PER 1,000 LIVE BIRTHS)

Year	First Week		First Month		First Year	
	Minn.	U. S.	Minn.	U. S.	Minn.	U. S.
1920	30.0	34.6	40.58	41.5	66.41	85.8
1925	30.0	32.6	34.22	37.8	60.01	71.7
1930	27.5	31.1	34.15	35.7	51.92	64.6
1933	26.0	29.8	32.20	34.0	45.30	58.1

Table I indicates the very limited decrease in mortality during the first week, and first month of life, as contrasted with the marked improvement during the first year. Infant mortality in Minnesota is among the lowest in the United States.

While infant mortality, during the first year of life has decreased over one-half in the last twenty-five years, during the first month it has lessened by only one-sixth, while during the first week the decrease has been even less. Thus, in Minnesota, in 1916, deaths in infants under one week comprised 40 per cent of all deaths occurring during the first year. In 1933, they represented 55 per cent of such deaths (Table I, Figs. 1 and 2). Two-thirds of all infant deaths now occur before the end of the first month. Prematurity as a cause of death has shown almost no reduction in recent decades. Birth injury as a cause of fatality is on the increase. This may be accounted for in part by more accurate diagnosis of such accident, but also to a definite degree is ascribed to the tendency to operative and instrumental methods of delivery. It has been said that 40 per cent of the neonatal deaths could have been prevented by adequate prenatal and obstetric care. A study made in Boston showed that the infant mortality in those cases where prenatal care was lacking, was double that in properly supervised cases, while stillbirths were over 50 per cent greater. Death during the first month of life is caused by asphyxia, atelectasis, prematurity, or birth injury, in two-thirds of the cases; nearly one-third die of infection contracted before, during or after delivery, while in less than 3 per cent can it be attributed to congenital anomalies.

---

*Read before the Ramsey County Medical Society, St. Paul, March 25, 1935.

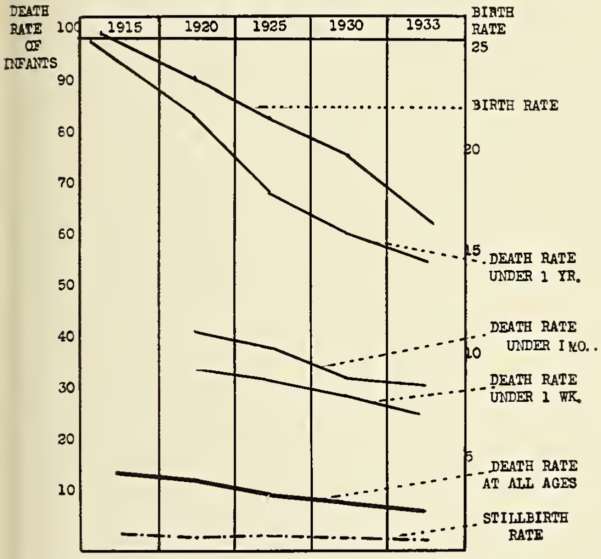


Fig. 1. The rapidity of decrease in mortality from one month to one year of life has considerably exceeded the decrease during the first month of life.

The value of thorough prenatal care to the fetus has not been as thoroughly appreciated, as for the expectant mother. Competent observers are agreed that the welfare of the infant is intimately related to the supervision given the pregnant woman. Gegenbach states that infant mortality is lowered in direct proportion to the number of visits made by the mother to her physician. A study made by Dublin and Corbin[4] of the records of 4,726 women who were given careful prenatal care, revealed not only a much smaller maternal mortality than in unsupervised cases, but also considerable reduction in stillbirths, and in all deaths in the newborn. They state their belief that were like attention rendered all pregnant women, 10,000 of the 11,500 women who die annually could be saved, many still-births prevented, and some 30,000 babies who now fail to survive the first year of life would be living. Toverud[15] has demonstrated that a well-balanced diet and careful prenatal care for expectant mothers favorably influences the weight and vitality of the newborn, while premature births are markedly reduced. The Maternity Center Association of New York, which administers intensive and systematic prenatal care, finds premature births occurring in 66 per cent less of its cases than elsewhere in New York City.

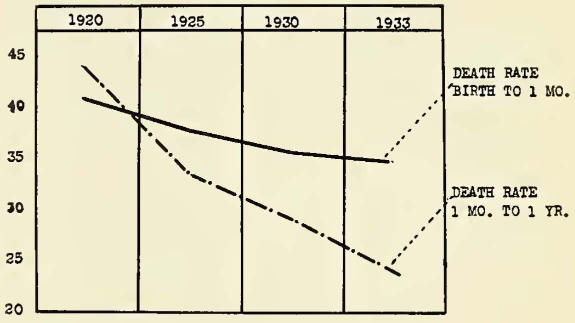


Fig. 2. The rapid drop in birth rate is paralleled by the decrease in deaths during the first year of life. Deaths associated with disabilities suffered before, during or after birth have decreased much less. The stillbirth rate has remained unchanged.

Litzenberg,[8] in 1933, stated that the actual number of deaths due to birth injuries has increased in Minnesota, as well as in the entire United States, despite a falling birth rate.

The more common conditions occurring in the newborn may be classified in four groups:

1. Disturbances of nutrition.
2. Infections.
3. Injuries.
4. Congenital anomalies.

Underfeeding in the newborn is common, occasionally resulting in excessive weight loss which causes dehydration, acidosis, and prostration. The so-called physiologic weight loss can be largely avoided, if desired, by beginning complemental milk feedings after the first day. This may, with benefit, be made a routine practice with all infants, especially those weighing under six pounds. Dwyer and Neff[5] consider this advisable; on the other hand, many authorities prefer to employ it only in indicated cases. If the mother's condition permits, the infant may be offered the breast six to twelve hours after delivery, and thereafter at four hour intervals. The emptying of both breasts at each nursing promotes an earlier and more profuse flow of milk, and most mothers find it necessary to adopt this practice on leaving the hospital. Where babies reveal a preference for the bottle to the breast, it may be necessary to discontinue formula feedings temporarily, lest premature weaning occur. Dehydration fever, so common on the third and fourth days, is entirely preventable by the administration of cow's milk mixtures, or water in sufficient amount. No infant should be permitted to lose over one-half pound; such loss calls for bottle feedings to complement the breast until the latter is adequate. Infants taking an insufficient amount at the breast do better if fed seven or eight times daily, while water feeding should be dispensed with if the temperature is normal. Stripping of the breast by hand, and the use of the breast pump, aid in stimulating milk secretion when the baby's nursing effort is feeble. The infant who is unable to nurse because of weakness should be fed breast milk by a Breck feeder, or by a nasal catheter.

Vomiting is often of serious significance, at this age, and requires careful investigation. Increased intracranial pressure, from birth trauma or edema of the brain, may be responsible. Sepsis presents it as an early symptom. Congenital obstructions of the gastro-intestinal tract, such as atresia of the esophagus or bowel, pyloric stenosis, cardiospasm, and pylorospasm, are heralded by persistent forceful vomiting, which suggests that prompt x-ray study be employed, and immediate relief of the obstruction attempted.

Infections play an important and dangerous part in the life of the newborn, and are, in the main, avoidable if cleanliness and asepsis are observed in the infant's care. The low resistance to most of the common infections makes such precautions essential at this age. Septicemia, pneumonia, and erysipelas, generally fatal to the newborn, develop easily.

Impetigo, often wrongly called "pemphigus," is exceedingly common, and frequently persists in hospital nurseries for months. It can cause fatal septicemia and should not be regarded lightly. Its appearance should call for prompt check of the sterilizing equipment; complete house-cleaning of the infant ward; careful examination of the nurses and attendants for staphylococcic and streptococcic infections, and immediate removal of infected babies from the nursery. The skin lesions respond quickly when the vesicles are at once removed with alcohol, 5 per cent silver nitrate solution applied, and then liberally dusted with an antiseptic powder, such as a mixture of three parts of calomel, two parts of talcum, and one part of zinc oxide. Soap and water baths should be avoided, and overheating be prevented. The skin should be kept very dry, and ointments or wet dressings are generally to be avoided. Sterile olive oil, or mineral oil, with one per cent copper oleate is recommended by Swendson[14] as a preventive.

Thrush is always an indication that asepsis has not been maintained in the care of the nipples. If severe, it will interfere with nursing. Boroglyceride, or one per cent silver nitrate, or one per cent aqueous solution of gentian violet should be applied frequently.

Dacryocystitis is a common condition, often secondary to the use of silver nitrate in the eyes at birth. If neglected, it may result in permanent stenosis of the naso-lacrimal duct. The pus should be expressed by pressure at the inner canthus, several times daily, followed by the instillation of argyrol or a similar antiseptic.

Hemorrhagic disease, while not usually of infectious origin, often accompanies sepsis. It is responsible for many deaths during the first week. It is usually due to temporary deficiency in prothrombin, is often accompanied by a decrease in platelets, and generally manifests a prolonged coagulation and bleeding time. The latter should be estimated promptly at the evidence of bleeding. Its first manifestations are usually the appearance of small amounts of blood in the stool, urine, vomitus, or from the cord. The prompt intramuscular injection of 20 c.c. to 30 c.c. of whole blood from any healthy adult usually relieves the condition; the dose may require repetition one or more times. In the more stubborn cases, direct intravenous transfusion may be necessary. Coagulants, such as fibrinogen, hemostatic serum, and coagulen, are not as valuable.

INFANT DEATHS DUE TO BIRTH INJURIES

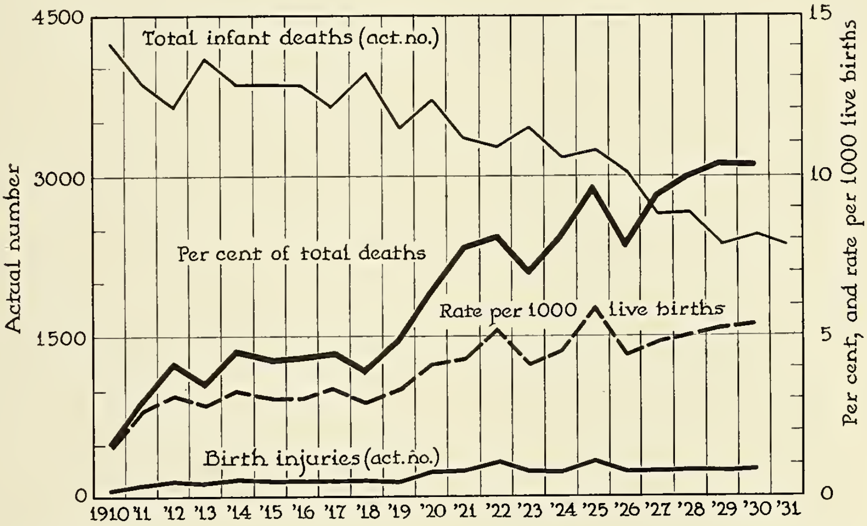


Fig. 3. Infant deaths due to birth injuries, in Minnesota, show both an absolute and relative increase. (Reproduced by permission of Dr. Jennings C. Litzenberg.)

Birth injuries play an exceptionally large role in the pathology of the newborn (Fig. 3). A very common one is the tearing of the sternomastoid muscle, especially frequent where excessive traction is applied to the neck, as in breech presentations. This causes a hematoma in the muscle, often not observed until two or three weeks later and then appearing as a hard oval mass in the body of the muscle. If untreated, such cases may result in permanent contracture with torticollis and severe deformity. Massage and stretching of the muscle should be begun early and be persisted in until the infant is able to move the head well in all directions.

Brachial palsy, due to rupture of the brachial plexus, with resulting paralysis of the arm, should be treated early by the application of a splint which holds the arm horizontal, abducted, and externally rotated, with the elbow flexed to right angle. Passive and active motion should be started early.

Fracture of the clavicle is a frequently overlooked injury, often not observed until the callus appears two or three weeks later. It is especially common after breech births. While requiring little or no treatment, its early recognition will save embarrassing explanations later.

Asphyxia of the newborn is often treated too strenuously, with injury or shock resulting. The rational treatment consists in removing mucus from the mouth and larynx or from the trachea by catheter; gentle spanking, flexion and extension of the body; rhythmic traction of the tongue, or stretching of the anal sphincter. Immersing the infant in cold water is not advised. Careful breathing into the baby's mouth, or blowing air into the trachea by catheter, may be attempted, but care must be exercised lest the delicate lung alveoli be overdistended, with pneumothorax or emphysema resulting. Most effective is the inhalation of oxygen with 5 to 10 per cent carbon dioxide, which directly stimulates the respiratory center. This may be administered through a mask, or by a catheter into the larynx; accompanying it artificial respiration should be attempted. The intimate relationship between asphyxia, atalectasis and pneumonia, in the newborn, and their frequent occurrence, would indicate that the methods and facilities for stimulating normal respiration at birth are not always adequate. Yandell Henderson, the physiologist, who has repeatedly stressed the value of oxygen with carbon dioxide, has said: "The first quarter hour after birth is the most dangerous period of life." Its mortality is as great as that of any subsequent month. No single discovery in medical science could do more to save lives than would measures to avoid the losses that now occur within a few minutes after birth.

Maternal narcosis is considered a common cause of respiratory difficulty of the newborn, and, as emphasized by Murphy and Sessum,[9] narcotics should not be administered within four or five hours of the expected time of delivery.

Intracranial hemorrhage presents a common and exceedingly serious injury. This occurs more frequently than is generally realized, and every prolonged or severe labor, forceps application, breech presentation, and premature delivery should be regarded as potentially liable to cause intracranial hemorrhage in the newborn. It is probably the most common cause of stillbirth, or early death, especially in premature infants, who are particularly predisposed to this accident. Gillespie[6] reports that autopsies performed at the University of Minnesota on 330 babies, dying before one month old, revealed birth trauma present in one-third, while prematurity was responsible in almost as many more. In autopsies done by Adair and O'Brien[1] in over 200 cases of fetal and neonatal deaths, dystocia and birth injury were the causes of death in over one-third. Holland and Lane-Claypon[7] also found that complications of labor were responsible for over one-third of stillbirths and neonatal deaths, in a large series of autopsies. Cruickshank's[3] careful study of 800 such postmortems confirms the previous reports.

The symptoms of intracranial hemorrhage include: asphyxia, particularly with pallor, feeble and irregular respiration (attacks of apnea); weakness; inability to cry or nurse; forcible vomiting; convulsions; spasmodic twitching of the limbs; bulging fontanelle. Spasticity is a later development. Gross bleeding may occur into the cerebro-spinal fluid, and lumbar or cistern punctures should be performed frequently, both for diagnosis and treatment. The presence of blood cells in the spinal fluid is not, however, necessarily pathognomonic of injury, while, as observed by Smith,[12] absence of blood does not necessarily rule out brain injury. He concludes that the other symptoms are the only satisfactory basis for making the diagnosis.

Treatment should include intramuscular injections of whole blood, early, as hemorrhagic disease may alone be the causative factor. Food should be administered by catheter, Breck feeder or dropper, as the infant is frequently unable to nurse. Once the hemorrhage has occurred, however, treatment is most unsatisfactory, as irreparable damage to the brain usually results. Preventive measures directed toward insuring a labor and delivery approximating the normal as closely as possible should be provided whenever practicable.

Authorities are generally agreed that the speeding up of delivery, by injudicious use of pituitary extract, or by the application of forceps, is often associated with intracranial hemorrhage. Plass[10] also calls attention to the increased stillbirth rate where forceps are used, yet finds such deaths still greater, following breech extraction. External version, to correct breech presentation, should be attempted whenever possible, according to Studdiford,[13] to lessen the danger to the fetus. DeLee has repeatedly cautioned against haste in the delivery of a breech; the asphyxia which may follow delayed delivery of the head is considerably easier to overcome than a ruptured spinal cord, or an intracranial hemorrhage which may result from forcible traction on the neck.

The prematurely born infant starts life with a tremendous handicap. By virtue of his immaturity he is more prone to cerebral hemorrhage, to pneumonia, to sepsis, and to digestive disturbances. The woman who fails to provide herself with proper prenatal care is more likely to develop eclampsia, nephritis, and other conditions which may induce labor prematurely. Where pelvic measurements indicate that a full term infant cannot be delivered safely, it may be necessary to induce labor before term, or to perform cesarean section. If this can be delayed until the fetus weighs at least five pounds, the possibilities of its survival are much brighter. An approximate idea of the fetal weight, in utero, can be obtained by determining the occipito-frontal diameter of the fetal head; this has been shown by Clifford[2] to possess a constant ratio to the body weight. Measurement of this diameter can be done with reasonable accuracy by x-ray, employing Davidson's technic.

Tetany of the newborn, a condition which resembles cerebral injury, is described by Shannon.[11] Associated with general and cerebral edema, there appears a marked tendency to spasms, convulsions, cyanosis, slow pulse, and other symptoms resembling those of cerebral hemorrhage. He states that the administration of calcium, parathyroid extract, and viosterol acts to promptly relieve the condition.

Various less serious conditions presented by the newborn include the following:

Cephalhematoma deserves mention only in connection with the desirability of foregoing any operative interference unless suppuration appears. Otherwise expectant treatment in this condition as in caput succedaneum is entirely sufficient.

Hydrocele should almost never be interfered with during infancy.

Phimosis is physiologic at birth, and the necessity for circumcision is extremely doubtful in the great majority of cases.

Tongue-tie is another normal condition rarely deserving the surgical attention so frequently applied.

Umbilical hernia is a very common condition usually subsiding spontaneously in a few weeks; if persistent, the simple infolding of the umbilicus, with retention by a wide strip of adhesive tape, will soon effect a cure.

Umbilical granuloma is a common condition, usually developing due to failure to maintain dryness and asepsis in the umbilicus. It usually prevents proper closure of the umbilical ring and is thus responsible for the later development of umbilical hernia. It disappears promptly if a ligature is applied around its pedicle, or if a silver nitrate stick is used.

Conclusions

1. The decrease in mortality in the neonatal period has failed to keep pace with that shown in later infancy, childhood and early adult life.
2. Deaths at this period, if due to congenital malformations and unforeseen accidents, are not preventable.
3. Education of women in the necessity of early and constant prenatal care is necessary.
4. Unceasing vigilance by the physician during pregnancy, and conservatism at the time of delivery, should insure the birth of more full-term normal infants.
5. Careful regulation of the feeding of the newborn, and strict insistence on aseptic handling, will reduce the frequency of digestive disturbances and infections.

Bibliography

1. Adair, F. L.: Causes of death in the fetus and newborn. Minn. Med., 8:586, (Sept.) 1925.
2. Clifford, S. H.: The x-ray measurement of the fetal head diameter in utero. Surg., Gyn. and Obst., 58:727, (April) 1934.
3. Cruickshank, J. N.: The causes of neonatal death. Spec. Report Series No. 145 Med. Research Council. London.
4. Dublin, L. J., and Corbin, H.: A preliminary report of a study of records of the Maternity Center Association of New York. Am. Jour. Obst. and Gyn., 20:877, (Dec.) 1930.
5. Dwyer, H. L., and Neff, F. C.: Complemental feeding in the newborn infant. Jour. Am. Med. Assn., 99:463, (Aug. 6) 1932.
6. Gillespie, J. B.: Infant mortality. Proceedings Staff meetings Mayo Clinic, 8:133, (Mar. 1) 1933.
7. Holland, E. L., and Lane-Claypon, J. E.: Causes of fetal and neonatal death. Special Report Series No. 109 Med. Research Council. London.
8. Litzenberg, J. C.: The status of obstetric practice in Minnesota. Minn. Med., 16:287, (May) 1933.
9. Murphy, D. P., and Sessums, J. V.: Asphyxia neonatorum. Surg., Gyn. and Obst., 55:432, (Oct.) 1932.
10. Plass, E. D.: The difficulties and dangers of forceps delivery. Jour. Am. Med. Assn., 99:817, (Nov. 26) 1932.
11. Shannon, W. Ray: Cerebral injury to the newborn. Am. Jour. Dis. Child., 48:517, (Sept.) 1934.
12. Smith, Howard: Blood in cerebrospinal fluid in newborn. Am. Jour. Obst. and Gyn., 29:99, (July) 1934.
13. Studdiford, W. E.: Breech presentations and their delivery. Jour. Am. Med. Assn., 99:1820, (Nov. 26) 1932.
14. Swendson, J. J., and Lee, S. R.: Impetigo contagiosa neonatorum. Jour. Am. Med. Assn., 96:2081, (June 20) 1931.
15. Toverud, K. A.: Nutritional condition of the newborn infant. Am. Jour. Dis. Child., 44:954, (Nov.) 1933.

HYPERPARATHYROIDISM*

ROSCOE C. WEBB, M.D.
Minneapolis

HYPERPARATHYROIDISM is now definitely known to be the cause of osteitis fibrosa cystica or Von Recklinghausen's disease, and it is also known to be the cause of a small percentage of the cases of urinary calculi. The history of the development of this information is as fascinating as the disease itself.

In 1834, an even hundred years ago, Raynard removed the entire thyroid gland from dogs, and death from tetany resulted, caused by the unknowing removal of the parathyroid glands at the same time. In 1884 Schiff again removed the entire thyroid gland, and 60 per cent of his dogs died within a week of acute nervous symptoms. Again the parathyroid glands had been unknowingly removed with the thyroid gland.

The actual discovery of the parathyroid glands was made by Sandstrom of Upsala, Sweden; they were described by him in 1880. Baber in London again independently described them in 1881. Due consideration was not given to this discovery until 1891, when Gley in Paris demonstrated that the parathyroids were frequently removed in total thyroidectomies and that the parathyroids were of vital importance. Gley's work was confirmed in 1900 by Vassale and Generali.

In 1907 Halsted and Evans found that the blood supply of each parathyroid gland came from a small single parathyroid artery which enters at a distinct hilum. The nerve supply of the glands is from the sympathetic nervous system. The venous and lymphatic drainage of these glands has received very little study and very little about this is known.

In 1901 Jacques Loeb demonstrated that symptoms of tetany could be produced by injecting a salt intravenously which would precipitate and diminish the blood calcium. MacCallum in 1909 demonstrated that the calcium content of the blood serum fell after parathyroidectomy and was the first to demonstrate the value of calcium in tetany. The parathyroid glands were thus proven to affect the available supply of calcium in the body. Decreased or impaired function of the parathyroid glands or hypoparathyroidism was thus proven to be associated with a low blood calcium without skeletal disturbances.

Hyperparathyroidism, parathyroidism, hyperfunction of the parathyroid glands or hyperactivity of the parathyroid glands are synonymous terms, and at this late date it would seem obvious that in this condition we should have a high blood calcium, and, as the bones are the most obvious source of calcium, we should have skeletal disturbances. However obvious this may seem, when the problem was settled, it was worked out in a reverse manner.

In 1891, Von Recklinghausen, writing in a Festschrift in honor of Virchow's seventy-first birthday, used the term osteitis fibrosa to describe a generalized softening and deformity of the bones with the formation of reddish brown tumors. The decalcification in two of his cases was so advanced that the bones could be cut with a knife. He regarded the disease as inflammatory in origin. Its course was slowly progressive. Many similar cases were reported in the literature.

In 1904, or thirteen years later, at necropsy, Askanazy reported the finding of a parathyroid tumor in a case of Von Recklinghausen's disease. It would seem that this finding would have completed the study and have supplied the answer to the problem. Erdheim had, however, suggested such a relationship in the previous year. The cause of osteitis fibrosa was considered to be a disturbed metabolism of calcium, and the parathyroid enlargement was interpreted as a compensatory hypertrophy. Erdheim had studied the parathyroids in rickets and postulated that hyperplasia in these glands is secondary to changes in the bones. The parathyroid enlargement was apparently considered in the same manner as simple thyroid enlargement. Parathyroid enlargements were as a result searched for at necropsies, and in 1925 Hoffheinz reviewed forty-five reported cases in twenty-seven of which there were skeletal changes.

In 1923 Adolph Hanson, a surgeon, interested in the parathyroids and not specially trained in chemistry, extracted the parathyroid hormone from bovine parathyroid glands in his home laboratory in Faribault, Minnesota. Hanson boiled the parathyroid glands in a solution of one per cent hydrochloric acid in distilled water to obtain the active substance. Hanson used this substance intramuscularly on parathyroidectomized dogs, and brought the serum calcium up to normal and also above normal, and reported these experiments in 1925.

---

*Read before the Western Surgical Association at St. Louis, Missouri, December 7, 1934.

In 1925 Mandl had a man thirty-eight years of age with osteitis fibrosa cystica, and in the light of our present knowledge it would seem that there was but one course to pursue. The relation between osteitis fibrosa cystica and parathyroid tumors had been frequently discussed. The question of extirpation of the tumor had been suggested but was rejected as too radical. He chose therefore the previous and apparently more conservative theory of Erdheim and transplanted the parathyroids from a moribund accident victim into the abdominal wall of his patient. His patient became definitely worse. Mandl then removed the transplanted tissue and explored the neck of his patient and removed a parathyroid tumor. His patient then steadily improved. Following the publication of Mandl's report there has been a steadily increasing number of cases reported.

In 1930 Jaffe and Bodansky injected parathormone into puppies and produced decalcification and resorption of the existing bone with fibrous replacement of the marrow and other features of osteitis fibrosa.

In 1931 Johnson and Wilder demonstrated that simultaneous administration of irradiated ergosterol and parathormone did not prevent the bone changes, thereby proving that the disorder is not one of vitamin D deficiency, such as osteomalacia and rickets.

Clinically, hyperparathyroidism occurs more frequently in females than in males. The course of the disease is usually measured in years. The symptoms include bone pains and tenderness, muscular weakness, attacks of nausea and vomiting, polydipsia and polyuria, loss of weight, pathological fractures, bone deformities, renal calculi and depositions of lime salts in other parts of the body. The serum calcium will be found increased and the serum phosphorus is diminished. Radiography will show generalized rarefaction of bones with numerous cysts.

Case Report

The case which I wish to report had several unusual features, among which was a strongly suggestive family history of this disease. The patient was a young woman, unmarried, twenty years of age, housekeeper for her father. On January 1, 1934, she was weighing herself, and on stepping backward off the scale, tripped over a suitcase and fell to the floor, fracturing both femurs in the upper thirds of the shafts. On January 2, 1934, she came under my care at the Asbury Hospital in Minneapolis.

Family History.—Her maternal grandfather had a very marked kyphosis which began to develop when he was a young man.

Her mother died at the age of thirty-five years when the patient was eleven years of age. She was small featured and of slight build. At the age of twenty she passed two renal calculi. She was always delicate and had severe headaches for ten years before her death. She had a weak stomach and suffered considerably from vomiting. Two years before her death she developed difficulty in walking, and had some joint trouble. One physician diagnosed a muscular atrophy. At about this time she began to develop a kyphosis. Eight months before her death she stumbled in her home and fractured a femur. This apparently healed, but she subsequently died, and the diagnosis given was osteomalacia.

Her father is living. One sister and one brother are living and well, aged sixteen and nineteen years, respectively. The family history is otherwise negative.

Past History.—The patient was apparently a normal girl until seventeen years of age, when she weighed 126 pounds and was five feet three and one half inches tall. She was on the basket ball team in high school until her senior year, when she was just seventeen.

Present Illness.—The present illness began in October, 1930, at the age of seventeen with a convulsion. She had nausea and vomiting for several days with albuminuria. This attack came on following exposure to cold. She remained in bed for one month, and she complained of aching in her legs and teeth. Recovery apparently occurred, but she subsequently had several attacks of uncontrollable vomiting following exposure to cold. Some time in 1932, about two years before admission to the hospital, she first noticed a nodule in the region of the lower pole of the right lobe of the thyroid gland. From the time of the onset of her present illness she felt that she had not much sense of balance. She would at times walk on the street in a weaving manner, causing her friends to remark about it. She never fell, however. In July, 1932, she had another severe attack of nausea and vomiting with albuminuria, and was kept in bed for a few weeks. In August, 1933, she had an attack of nausea and vomiting and albuminuria, accompanied by pains in the legs. She was tired and weak and was kept in bed for six weeks with the diagnosis of toxic goiter. After this attack she had more difficulty in walking, and she had pains from her knees to her hips. The thigh regions felt sort of stiff and hurt when she walked. She drank more water than usual, with associated increase in urinary output during the day and at night. During the two years before admission she did not like cheese, and was barely able to drink milk. She liked cream and green vegetables, but could not eat eggs unless they were hard boiled. Her weight, two months before admission, was ninety pounds, and on the day of injury it was one hundred and five pounds.

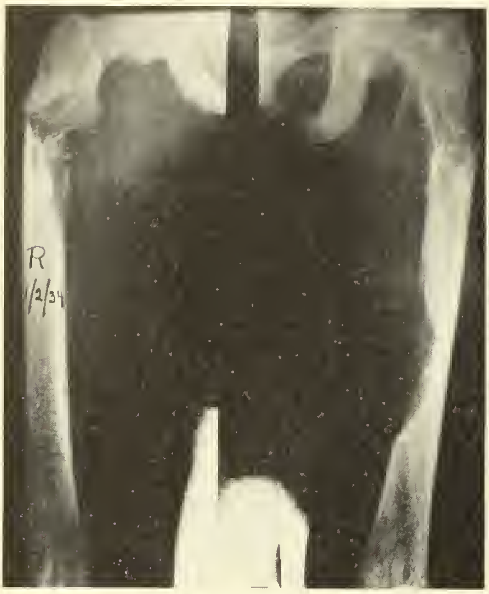


Fig. 1. X-ray of both femurs January 2, 1934, showing fracture of each shaft in the proximal third. There is a large area of bony destruction about the site of each fracture. Note the destruction causing a decrease in the size of the neck of the left femur as compared to the right. Note area of destruction in middle third of left femoral shaft. Also note the absorption and trabeculation of the distal portion of each femur. Areas of destruction may also be seen in the inferior ramus of the left pubis.

Examination.—On physical examination she was fairly well developed, rather poorly nourished and weak. She appeared acutely ill. The teeth were in good condition. The neck appeared normal, but on palpation of the thyroid gland in the region of the right lower pole, a nodule about the size of a walnut could be felt. About two-thirds of the lump would recede under the sternum. The lump was attached to the thyroid. It was not tender, and had the general appearance of an adenoma of the thyroid. The heart rate was about one hundred per minute. The upper extremities were weak; she was unable to handle herself in bed with the aid of an over-head trapeze. The lower extremities were fractured just below the hip region and were in splints. The physical examination was otherwise negative.

X-ray examination was made immediately of both femurs by Dr. R. G. Allison. These showed pathological fractures through the proximal thirds of the shafts with slight over-riding and lateral angulation of the fragments. There was marked destruction of bone in this region. There was marked destruction of bone on the medial side of the shaft of the left femur at the junction of the middle and distal thirds.

Additional x-rays of the skeleton were also made. There were areas of bony destruction in the pelvic bones, the ribs, scapulæ, the proximal thirds of both humeri and the vertex of the skull. The bones of the skull showed a somewhat granular ground glass appearance which was also present in the entire lumbar and dorsal spine. Dr. Allison reported that the appearance of these lesions was that associated with hyperparathyroidism.

The patient was placed in bed with both lower extremities in Thomas splints with Pearson attachments and suspended in abduction from an over-head frame. Traction was made with adhesive plaster on both thighs, and a weight of fifteen pounds was placed on each. (Skeletal traction is not feasible because of the extreme softness of the bones.)

The temperature was approximately 100 degrees during the evenings of the first three days. Pulse rate ranged from 90 to 110; respirations 20 to 25. Blood pressure: 135 systolic and 95 diastolic. Urine examination, January 3, 1934: specific gravity 1.010, acid, trace of albumen, slight reduction of sugar. January 4, sugar was absent. Blood examination, January 3, 1934; hemoglobin 77 per cent; r.b.c. 4,200,000; w.b.c. 15,200; pmns. 77 per cent, lymphocytes 14, large mononuclears 6, eosinophiles 2, basophiles 1. Red blood cells normal. Wassermann test was negative. Basal metabolism test was minus 4 on January 4. Blood calcium examination was made by Dr. Floyd Grave and reported as 14.3 per cent, which was about fifty per cent above normal.

Operation.—The slight fever and the increased white blood cell count were associated with a slight upper respiratory infection, and operation was delayed until January 10, 1934.

The patient was taken to the operating room wearing the Thomas splints with pulleys attached to the ends of the splints and ten pounds traction on each. The ends of the splints were tied to the lower end of the operating table, thus permitting traction and at the same time keeping the patient on the table while the head of the table was raised in the usual position for a goiter operation.

Using local anesthesia, the usual collar incision was made, and the thyroid gland was exposed on both sides. The thyroid gland appeared normal in size, shape and consistency except that on the right side at the lower pole there was a nodule about the size of a walnut which had the general appearance of a thyroid adenoma.

Both lobes of the thyroid gland were carefully separated laterally and turned forward. Two parathyroid bodies were identified on the posterior surface of the left lobe, and the superior parathyroid body was identified on the right lobe. The tumor at the lower pole of the right lobe was then dissected from its attachment to the thyroid and found to be a distinctly separate nodule. The nodule was immediately examined under the microscope and identified as a parathyroid tumor. The wound was then closed in the usual manner, and the patient was returned to her bed with the lower extremities in suspension and traction with abduction.

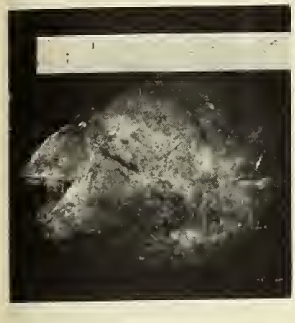


Fig. 2. Parathyroid adenoma, gross specimen, external surface.

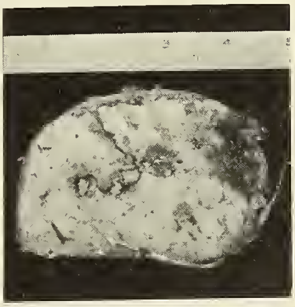


Fig. 3. Parathyroid adenoma, gross specimen, cut surface.

The pathological report by Dr. J. S. McCartney was as follows: Under low power the tumor has a uniform appearance of rather pale staining masses of cells with here and there connective tissue which slightly separates into lobules. There are occasional large hyaline masses scattered irregularly through the section. Under high power there is a suggestion of nest arrangement; there is no suggestion of glandular formation, and a fine connective tissue is separating these nests from one another. The cells making up the nests for the most part are very pale staining. Many cells take practically none of the eosin stain. Some stain deep pink. The cell borders are very sharp with some variation in the size of the cells. Individual cells look not unlike liver cells. There is great variation in the size of the nuclei, some being very small and some extremely large. No mitotic figures are seen. Most of the nuclei are vesicular and very hypochromatic. Most of the cells contain a single nucleus, but multinucleated cells are not uncommon. Aside from the hyaline masses there is nothing which in any way suggests colloid. Diagnosis: parathyroid adenoma.

During the first three days following operation, both sides of her face and both hands felt numb. There was no other evidence of post-operative tetany. The convalescence from the operation was otherwise uneventful.

As soon as she was able to take a full diet she was given milk with each meal and between meals. Cheese in various forms was included in the daily diet, and she was also given calcium gluconate. As this was not a deficiency disease, she was not given any medication to supply vitamin D.

She rapidly gained strength and in a few weeks was as comfortable as any patient with similar fractures.

On February 6, 1934, one month after operation, the blood calcium report by Dr. Grave was 9.3 mgm. per cent. April 17, 1934, the report on the blood calcium was 9.9 mgm. per cent. The blood examination on April 14, 1934, was: hemoglobin 83 per cent and red blood cell count: 4,600,000.

X-ray examinations were repeated at frequent intervals. On March 13, 1934, two months after operation, x-rays showed the fractures of the two femurs united in good position with bony callus. There was slight evidence of new bone in the lesion in the middle third of the left femur.

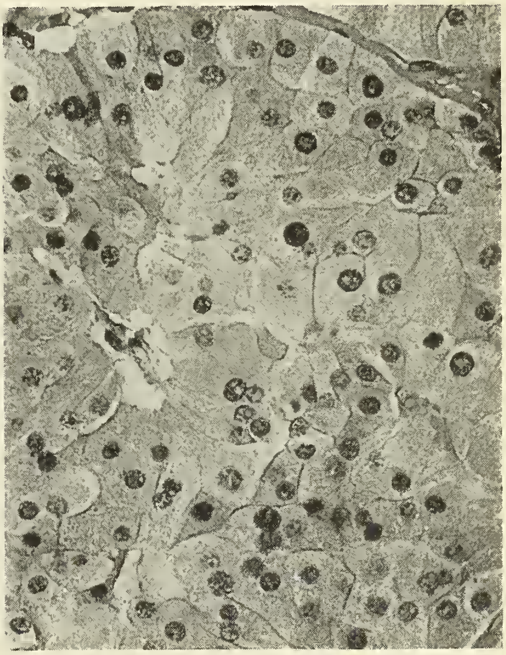


Fig. 4. Parathyroid adenoma, photomicrograph.

On May 10, 1934, four months after operation, the fractured femurs were shown to be firmly united in good position. The defects in the neck of the left femur and in the middle third of the left femur showed definite increase in new bone formation. The coarse trabeculations of the shafts of the femurs shown in the original x-rays were definitely less pronounced. The cystic area in the inferior ramus of the left pubic bone had filled in completely.

On June 14, 1934, five months after operation, the patient was allowed up on two walking caliper braces and crutches. Her weight at this time was one hundred and thirty pounds.

On June 20, 1934, she left the hospital for her home.

September 5, 1934, nine months after removal of the parathyroid tumor, x-rays showed the fracture of the left femur firmly healed. The walking caliper brace on the left lower extremity was discarded. The brace on the right lower extremity was continued because of slight lateral angulation at the point of fracture, and because the union did not appear as firm as on the left.

On November 23, 1934, the right walking caliper brace was removed, and she was discharged as cured. The lower extremities were of equal length, and each measured thirty and one-half inches from anterior superior spine to the internal malleolus. Her weight was one hundred and thirty-seven pounds. Her height with shoes off was five feet, two inches. She stated that she had not felt as well since her high school days, three years previously.

X-rays taken of the two femurs showed bony defects well repaired. X-rays of the two humeri showed improvement with the destructive areas about half regenerated.

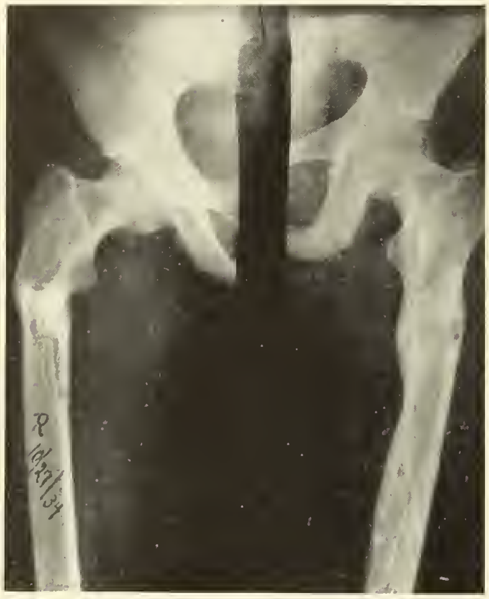


Fig. 5. X-ray views of both femurs October 29, 1934, nine and one-half months after removal of parathyroid adenoma. Note the repair in the inferior pubic ramus, the regeneration in the neck of the left femur, the repair of the fractures and the destructive areas about the fracture area, the repair of the area of destruction in the middle of the left femoral shaft and the disappearance of the coarse trabeculations in the femoral shafts.

The treatment of hyperparathyroidism is removal of the parathyroid adenoma. Fortunately, multiple adenomata are rare. The adenoma, however, may not be large. The severity of the disease is apparently not dependent upon the size of the tumor. The parathyroid adenoma may arise from any one of the parathyroid glands and the situations of the tumors are as variable as those of the glands themselves. The tumors have been found retrosternally in the posterior mediastinum, in the anterior mediastinum posterior to the posterior thyroid capsule and in the thyroid gland itself as well as in the more common locations.

The preoperative treatment should consist of a diet rich in calcium, such as milk and eggs accompanied by calcium gluconate by mouth.

The post-operative treatment should be a continuation of the preoperative treatment. In addition, the surgeon should be prepared to give paroidin (Hanson) intramuscularly and calcium chloride intravenously in case symptoms of tetany appear. As the disease is not a vitamin D deficiency condition, irradiated ergosterol is not indicated.

References

Askanazy, M.: Ueber Ostitis Deformans ohne osteides Gewebe. Arb. a. d. Geb. d. path. Anat. Inst. zu. Tubingen, 4:398-422, 1904.

Baber, E. C.: Researches on the minute anatomy of the thyroid gland. Phil. Tr. Roy. Soc., London, 172:577-608, 1881-82.

Colby, Fletcher H.: Urinary calculi associated with parathyroid disease. Surg., Gynec. and Obst., 59: 210-214, 1934.

Erdheim, J.: Tumor des Epithelkosperchens. Beitr. z. path. Anat. u. z. Allg. Path., 33:214-218, 1903.

Gley, E.: Sur les fonctions du corps thyroide. Compte.-rend. Soc. de biol., Par., 9, s, 3:841-842, 1891.

Halsted, W. S., and Evans, H. M.: The parathyroid glandules. Ann. Surg., 46:489-506, 1907.

Hanson, Adolph M.: An elementary chemical study of the parathyroid glands of cattle. Mil. Surgeon, 52: 280-284, (Mar.) 1923.

Hanson, Adolph M.: The hormone of the parathyroid gland. Proc. of Soc. for Exp. Biol. and Med., 22: 560-561, 1925.

Hoffheinz: Uber Vergrosserungen der Epithelkorperchen bei Ostitis fibrosa und werwandten Krankheitzbildern. Arch. f. path. Anat. u. Physiol., 256: 705-735, (Dec.) 1925.

Jaffe, H. L.: Bodansky, A.: Experimental fibrous osteodystrophy in hyperparathyroid dogs. Jour. Exper. Med., 52:669-693, 1930.

Johnson, J. L., and Wilder, R. M.: Experimental chronic hyperparathyroidism. Am. Jour. Med. Sci., 152:800-807, 1931.

Loeb, Jacques: Am. Jour. Physiol., 5:362-373, 1901.

MacCallum, W. G., and Voegtlin, C.: On the relation of tetany to the parathyroid glands and to calcium metabolism. Jour. Exper. Med., 11:118-151, 1909.

Mandl, Felix: Therapeutischer Versuch bei einem Falle von Ostitis fibrosa generalisata mittels Exstirpation eines Epithelkorperchentumors. Zentralblatt f. Chir., 53:260-264, (Jan.) 1926.

Raynard: Rec. de med. vet. Par., 13:8, 1834-36.

Sandstrom, I.: Om en Kortel hos menniskan och atskilliga daggdjur. Upsala Lakeref, Forh., 15:441-471, 1880.

Schiff: Rev. med. de la Suisse rom. Geneve, 4:425-445, 1884.

Vassale, G., and Generali, F.: Fonction parathyreoidienne et fonction thyreoidienne. Arch. ital. d. biol., Turin, 33:154-156, 1900.

Von Recklinghausen, F. D.: Die Fibrose oder deformirende Ostitis, die Osteomalacie und die osteoplastische Carcinose in ihren gegensitigen Beziehungen. In: Fetschr. f. Rudolf Virchow, Berlin, Reimer, 1891.

Discussion

Dr. Arnold Schwyzer (St. Paul, Minn.): I really have no right to open this discussion, but on the train coming down, Dr. Webb asked me to say a few words.

This case is a paradigm. You have here an entirely normal thyroid with exception of a lump down in the lower pole, and that being an adenoma, which is clearly of parathyroid character, as you see on the screen. The photomicrograph is very good, much better than many we have seen.

The history was classical for the parathyroid adenoma. The patient just fell over a suitcase and fractured both femurs. But there is something more in the history, in that the patient's mother, late in life, started with severe curvature of the spine and, on a slight injury, fractured her right femur, which leads us to believe that there may be something familial in these cases. Of this we know very little, and it is stimulating for us to look into this condition in other cases.

In the postoperative course there is something that stands out in these cases. In one of my own there was a striking result—the patient came in and was herself very surprised how well she felt, and how promptly this improvement set in. This is the rule in these cases. Why is that? If hypoparathyroidism is pronounced, tetany follows. The threshold for muscle stimulation is greatly lowered, while in the hyperparathyroidism it is raised—it takes more electricity to contract the muscle. The patients have become languid, they feel tired, they feel worn out and old, and they may not know this is a feature of the disease. After the operation all this worn-out condition disappears promptly, long before the bones show any changes in the x-ray picture. But the blood calcium is changed and therefore the patient feels this prompt improvement. In the picture we saw the splendid callus formation in the two femurs where nothing had been left of real bone tissue, only some cysts with a thin shell. This started me wondering whether in delayed union it would not be a sensible thing to attempt to reduce the action of the parathyroids, even if they should be normal.

Dr. Kellogg Speed (Chicago, Ill.): The changes in calcium metabolism induced by both hypoparathyroidism and hyperparathyroidism lead to very fascinating physiologic states, of which Dr. Webb's case is an example. Hyperparathyroidism interferes with the healing of fractures, as I showed experimentally several years ago.

I wish to show you a picture of a woman who was first seen in 1926 (lantern slides). She was thirty-two years old and had pain in her back, thumb and pelvis. In the pelvis was a spot of cystic degeneration of the bone, which in hyperparathyroidism always starts by attacking the cancellous portion of the bone, for it is that part which is exposed to better blood supply and the action of the hormone. She had also, in the jaw and in the thumb, a large cystic area. The cystic mass in the thumb was excised and found to consist of a thick, fibrous periosteum enclosing a reddish cystic mass of bone, with some spicules left behind showing many giant cells in the microscopic section. The pathologic diagnosis was giant cell sarcoma. Immediately after the excision of the cyst a transplant of bone of proper size, taken from the tibia, was inserted at the base of the thumb to take the place of the degenerated metacarpal which had been completely removed.

This transplant has been watched for about nine years. The bone in the course of a year assumed, somewhat, the aspect and shape of a metacarpal bone, but its density remained as of the original time of transplantation. This density slowly changed from year to year, and finally, after eight years, the bone has assumed, more or less, the shape of the metacarpal, and function has almost returned to normal, so the patient can sew and use her hand quite well. Her spine, in the meantime, has shrunken about four inches. The interesting point which is difficult to understand is that if the blood was surcharged with parathormone why did it not take up this bone transplant and transform or absorb it rapidly? Is there some difference in the absorption of cortical bone as compared to the medullary? Her blood calcium has remained about the same, 13.6 all the time. She has, at times, passed urine like milk; has had many urinary calculi and is a pitiable object from whom I cannot get permission to remove the parathyroid gland.

Dr. Frank H. Lahey (Boston, Mass.): I hesitate to inflict myself on you, except that I have had some interesting experiences with these hyperparathyroid tumors that may be of some interest to you.

It is interesting to note that this patient who was operated upon in 1925 has again appeared in the literature in the last year. At return the patient was reoperated on, with two normal parathyroids and two parathyroid tumors. I think the question is not settled. As you know, Dr. Albright and an associate have done some very interesting work. They are convinced that one can have the same difficulty from the parathyroids as from the thyroids, that they can have hyperplasia and so on. I think this is difficult, but it may explain why some of these patients who have adenomas removed may have recurrences. We have had five of these cases in which the parathyroid adenoma was discovered within the thyroid itself. In three hyperparathyroid cases, which I saw at the City Hospital, they had been removed and yet the patients were not relieved, and on further search the parathyroid adenoma was found within the thyroid itself. I would suggest that you carefully palpate the thyroid gland for the presence of the intrathyroid parathyroid growth there. They pulsate very markedly and also may be very small.

Another interesting point is that tetany may accompany all these cases. If this occurs it must be that the calcium is maintained by the parathyroid, and the same situation has arisen with us in relation to cortical adrenal adenomas. I recently reported to the A. M. A. the case of a patient with a typical adrenal tumor who finally died and we found an adenoma on the other side. I think this is a parallel situation which explains the recurrence of these symptoms in hyperparathyroidism.

EDITORIAL

MINNESOTA MEDICINE
Official Journal of the Minnesota State Medical Association
Published by the Association under the direction of its Editing and Publishing Committee

EDITING AND PUBLISHING COMMITTEE
J. T. Christison, Saint Paul   C. B. Wright, Minneapolis
E. M. Hammes, Saint Paul   T. A. Peppard, Minneapolis
Waltman Walters, Rochester

EDITORIAL STAFF
Carl B. Drake, Saint Paul, Editor
W. F. Braasch, Rochester, Assistant Editor
C. A. McKinlay, Minneapolis, Assistant Editor

Annual Subscription—$3.00.   Single Copies—$0.40
Foreign Subscriptions—$3.50.

The right is reserved to reject material submitted for editorial or advertising columns. The Editing and Publishing Committee does not hold itself responsible for views expressed either in editorials or other articles when signed by the author.

Classified advertising—five cents a word; minimum charge, $1.00. Remittance should accompany order.

Display advertising rates on request.

Address all communications to Minnesota Medicine, 2642 University Avenue, Saint Paul, or 324 Fourth Avenue South, Minneapolis. Telephones: Nestor 1381 and Dupont 1013.

BUSINESS MANAGER
J. R. Bruce, Saint Paul

Volume 18   OCTOBER, 1935   Number 10

Poliomyelitis In 1935

The epidemic of poliomyelitis from which the East has been suffering this summer began in North Carolina and had reached such proportions by August that the President deemed it wise to cancel the Boy Scout Jamboree scheduled to be held in Washington, D. C.

Though not so malignant nor extensive an epidemic as has been experienced by various other parts of the country in previous years, an epidemic of infantile paralysis, so-called, always strikes terror to a community.

The medical profession has had little of established value to offer in the treatment of this disease. The enthusiasm for immune serum and adult serum has waned. Its value is probably limited to the cases receiving injection soon before exposure. Instead of the disease beginning as a generalized infection eventually resulting in anterior horn involvement, there is good experimental evidence to show that the infection gains its entrance to the human organism through the olfactory passage, attacking the central nervous system by way of the olfactory nerves and bulb. If this be true, serum treatment after the onset of symptoms is not likely to be effective. If less than one in sixteen of individuals infected develops paralysis and the majority of adults possess an active immunity, evidence of a previous infection, the hope of controlling the disease seems to rest in the development of a vaccine.

Recent research has given some promise of developing a successful vaccine. Kolmer of Philadelphia has used a 4 per cent emulsion in 1 per cent sodium ricinoleate of spinal cord obtained from monkeys infected with the disease. Although this emulsion is capable of producing the disease by direct injection intracerebrally in monkeys, no untoward results have followed in any of the 6,000 or more individuals so far injected. He had proved the development or increase in antibody formation in twenty-one of twenty-five children originally inoculated.

Brodie of New York has been using a similar emulsion inactivated with 0.1 per cent formalin. His preparation is not capable of producing the disease on intracerebral injection and prophylactically is given in larger doses. Some 4,000 individuals in the vicinity of New York have been inoculated with his vaccine.

Fortunately, the epidemic has not made its appearance in Minnesota although a few cases have been reported. We are not likely to suffer this year, as the disease subsides with the coming of frost.

Nevertheless, this work with vaccination going on in the East will be watched with great interest. The peculiar characteristics of an epidemic of poliomyelitis require extensive trial of any vaccine before conclusions are justified.

Extension Courses

Medicine covers such a wide field that there is no end to the acquisition of new knowledge. Personal experience is a good teacher, but the experience of others is indispensible.

The professional life of the older practitioners covers the period of greatest advance in medical science. But even the recent graduate must continuously study and add to his fund of knowledge if he is to keep abreast with medical progress.

The development of extension courses in connection with medical schools has come to be recognized more and more as a practical means for the busy practitioner to keep abreast of the times. The University Medical School, in conjunction with the Committee on Hospitals and Medical Education of the State Medical Association, provides a variety of such extension courses and the report for the past year shows an increasing interest in these courses on the part of practitioners throughout the state.

Medical short courses were held during the year 1934-1935 at Austin, Olivia, Blue Earth, Albert Lea, Glencoe and Hutchinson, thirty-eight lectures in all, with an enrollment of ninety-three. A short course was also held September 24 and 25, 1934, at the University. This consisted of clinics on cancer, diabetes mellitus, heart disease, fractures and tuberculosis. Some ninety-three physicians took advantage of this course. Other courses included evening lectures by Dr. Diehl on Preventive Medicine, by Dr. Ellis on Allergy, by Dr. Myers on Diseases of the Chest.

The Refraction Course conducted at the University by the Department of Ophthalmology last April was so successful that it will be repeated in November. Announcement of this full time course appears elsewhere in this issue of the journal and the details pertaining to the course can be obtained by reference to the announcement in the March number of MINNESOTA MEDICINE (page 171). The success of this course suggests that similar intensive full time courses in other fields of medicine and surgery might be equally valuable.

During the last winter, 242 physicians were enrolled in the extension courses furnished. It is a simple matter for a county society to arrange for a course and we predict an even greater enrollment this winter.

Medical and surgical clinics will be held this year at the University on the two days preceding the Homecoming game, October 24 and 25.

Thomas McCrae

The passing of a man of the caliber of Dr. Thomas McCrae deserves more than casual mention. His name will ever be closely linked with that of Sir William Osler with whom he was closely associated in practice and in medical literature. His brilliance has undoubtedly been somewhat dimmed by the outstanding position held by Osler in his generation.

Born in Guelph, Ontario, Dr. McCrae studied at the University of Toronto, receiving the degrees of Bachelor of Arts in 1891, Bachelor of Medicine in 1895 and Doctor of Medicine in 1903. He became an Instructor in Medicine at Johns Hopkins Medical School in 1900, an Associate in Medicine in 1901 and an Associate Professor in 1906. In 1907 he became a Fellow of the Royal College of Physicians.

Dr. McCrae moved to Philadelphia in 1912 to accept the appointment as Magee Professor of the Practice of Medicine and Clinical Medicine at the Jefferson Medical School. He served as chairman of the section of the Practice of Medicine of the American Medical Association in 1914-1915 and was a past president of the American Association of Physicians.

Assisting Osler in the editing of the first edition of his System of Modern Medicine, which was published in the years 1907-1910, McCrae re-edited the third edition of 1925-1928. Fully as important for practitioners in English speaking countries has been the continuation by Dr. McCrae of the publication each five years of Osler's one volume Practice of Medicine, which still is the most valuable single volume on medical diseases.

We can only bow our heads in awe at the close of a life which showed such undeniable evidence of medical genius and industry. The name of McCrae will be handed down in history as doubly famous. It had already become well known through Dr. Thomas McCrae's brother, the late Dr. John McCrae, author of the World War poem, "In Flanders' Fields."

MEDICAL ECONOMICS

Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association

B. J. Branton, M. D.
J. A. Moga, M. D.
W. F. Braasch, M. D., Chairman
J. C. Michael, M. D.
A. N. Collins, M. D.

What Can I As An Individual Member of the County Society Do to Help Organized Medicine?

The above question is heard in varying guises whenever doctors get together to talk about the problems of the medical profession. One suggestion will accordingly be offered in these columns each month as an aid to those who are at a loss for something to do and who want something definite and concrete.

Suggestion Number One

This month's suggestion concerns the high school debates on State Medicine (*See* Debating State Medicine, below).

What can you do about it?

1. Get acquainted with the debating coach and members of the debate teams in your high school if they are entering the state championship contest.

2. Write to the State Secretary's office for information on the subject, particularly on the negative side and including material printed in the Medical Economics columns of MINNESOTA MEDICINE during the past year or more.

3. Be present at the time of the debate.

4. Request that you be given the privilege, after the debate is over and the decision given, of explaining to the assembled listeners the dangers to the practice of medicine and to the public health of the socialization of medicine.

5. Enlist the coöperation of your wife, who is doubtless a good member of the Auxiliary. She can help you in this project. In fact, there is no reason why several members of the county society and their wives cannot coöperate in carrying on this work.

Debating State Medicine

The Ninth Annual Debate Handbook (1935-1936) on "Socialized Medicine" is now off the press.

High schools all over the State have reconvened and within a short time literally hundreds of boys and girls will be studying this handbook, first and foremost, for all the arguments for and against the following proposition:

> "Resolved: That the Several States Should Enact Legislation Providing for a System of Complete Medical Service Available to All Citizens at Public Expense."

Whether or not this is a proper subject for high school debate may be open to question. But objections on that ground are beside the point now.

It remains only for the 1935-1936 schedules to be completed and the debate coaches all over the State will be at work instructing and guiding their young charges.

102 Schools Engaged

Last year 102 high schools engaged in these inter-scholastic debates arranged and scheduled under the auspices of the Minnesota State High School League, which manages all of the inter-scholastic, athletic, debating and oratorical meets for Minnesota schools.

There is no doubt in the mind of Mr. O. E. Smith of Anoka, director of the League, that the same and perhaps still more high schools will enter the debating contest this year.

These high schools are divided into regions. The high schools within the regions compete for regional honors. The regional winners compete for state honors. Then the two winners in the state contests compete for the championship. The schedule is so designed, furthermore, that each debater will have a chance to defend both the affirmative and the negative.

Thousands Will Hear

In all, thousands of persons in Minnesota will hear the earnest arguments of youngsters, pro and con, this winter concerning medical care and the lack of it; concerning the amount of the doctor's bill and the difficulty of collecting it;

concerning new methods of practice which may or may not bring better medical care to all of the people at a lower cost, according to the side on which they may be laboring.

Here is a debate subject, furthermore, concerning which all who participate and most of those who hear it have had some experience. They will therefore feel a much more personal interest in it than in the old standbys such as disarmament and taxes, and, in fact, Mr. Smith reports an unusual interest evident already in the subject.

What, then, will be the sources of information toward which the debate coaches in these 100 or more schools will direct their charges?

First, there will be the handbook. This handbook was edited by Mr. Bower Aly, debate coach of the University of Missouri. It is designed to cover both sides of the argument and it will be purchased at cost, through Mr. Smith's office, by each of the schools entering the debate for use of their debaters.

Free Material

In addition to the handbook, two packets have gone out or will go out from Mr. Smith's office to each of the schools. One of these contains the following pamphlets supplied by the Julius Rosenwald Fund, and all of these, of course, supporting the case for a reform of medical services:

The Survey Graphic, December, 1934 (devoted exclusively to medical care and called "Buying Health")
Economic Aspect of Medical Services, Committee on Costs of Medical Care
Picture Book on Costs of Medical Care, Julius Rosenwald Fund.
Case Stories in Medical Services
Laymen's Views About the Costs of Medical Care (Chamberlain, Waldron, Crichton)
Ability to Pay for Medical Care
American Approach to Health Insurance, by Michael M. Davis.
Medical Economics by Brooks Quimby

From the American Medical Association, the following pamphlets:

A Critical Analysis of Sickness Insurance
Some Defects in Insurance Propaganda
Sickness Insurance Catechism
Sickness Insurance not the Remedy

"Health Heroes" Included

The other packet contains the Metropolitan Life Insurance Company's series on Health Heroes, designed to give the debaters a background of the great accomplishments of medicine and medical men.

Along with the handbook goes, of course, the bibliography prepared by Mr. Aly and listing many excellent sources of information, only part of which will be accessible to debaters in the rural high schools.

It is obvious, so far as the free material immediately available through the school channels goes, that the negative of this proposition is inadequately represented. This is the side which organized medicine will maintain in the wider debate on the same subject that will quite possibly go on in the halls of Congress within another year.

Physicians Disagree

Furthermore, the Debate Handbook will find physicians in disagreement with some of the premises and conditions laid down at the start as matters for acceptance without argument by the debaters.

There is no doubt, whatever, that Mr. Aly intended to prepare a book which should be equally useful for both affirmative and negative debaters.

He leaves it, however, to Professor Brooks Quimby, director of debating for Bates College, Lewiston, Maine, and a member of the Committee on Wording of the Debate Proposition for the National University Extension Association, to sketch in the field for the debaters. Mr. Quimby is an economist himself and editor of the Pollak Foundation's "Debater's Handbook on Medical Economics."

Many Receive Inadequate Care

The following are given as accepted facts which presumably neither side of the controversy will deny in Mr. Quimby's article selected by Mr. Aly to lay the groundwork for the controversial articles that succeed it. (One of the latter is by Michael Davis, arch-protagonist of sickness insurance, the other by Dr. R. G. Leland, director of the Bureau of Medical Economics of the American Medical Association.)

> "Partly, at least, as a result of the unequal burden on individual families, many people are not receiving proper care . . ."
>
> "Many smaller communities do not have sufficient people or income to support a physician while Chicago has physicians on its relief roll. . . ."

"In cities for lack of organization of the profession there is a helplessness and incapacity to search out medical service needed from the bewildering array offered. . . ."

The Battle is On

"With the impossibility of any one family budgeting illness and with the resulting lack of adequate medical care the main question is clear; what can be done to enable every person to have adequate medical care at a cost within his means?" . . .

"The battle is on," says Mr. Quimby in conclusion. "Out of it will surely come a greater understanding of our present-day problems and an evaluation of the possibilities of experiments already in the process of development and, possibly, an American solution of one of our greatest social problems."

No one hopes more than the medical profession that greater understanding of economic problems will come out of these debates. But physicians do not, at the outset, agree that better distribution of medical care is one of our greatest social problems.

Open to Question

They consider it decidedly open to question that "something must be done to enable every person to have medical care at a cost within his means," particularly if that something involves any radical change in the present system of delivering medical care.

They consider it open to question that any great number of people who really want it have been deprived of medical care. They gravely doubt, also, if everyone who needed it would make use of facilities for medical care even if they were made available at no cost by the government. They also doubt very much if the kind of medical care thus provided would be worth the money it cost.

Thus the physician opposes a totally different set of facts to those regarded as self evident and beyond need of argument by the economist.

Who is to present the physician's point of view to these high school boys and girls?

Medical Packet

The Minnesota State Medical Association has assembled some additional material at state headquarters, 11 W. Summit Avenue, St. Paul, which will assist materially in supplying the physician's point of view.

It includes a handbook on the subject prepared by the American Medical Association's Bureau of Medical Economics which assuredly should be made available to every debater on this subject. This handbook *will not* go out in the free packet sent from the League Headquarters in Anoka. It will be a part of the library loan packet from the American Medical Association but only a few will get at it by that method and it is therefore imperative that debaters all over the state be urged to send to state headquarters in St. Paul for it.

Minnesota Personages

The State Medical Association's packet will include, also, some material of special importance to Minnesota students, notably talks by personages known to all Minnesotans, Archbishop John Gregory Murray of St. Paul, and Dr. C. W. Mayo of Rochester. It will include also the important paper by Dr. R. E. Scammon of the University of Minnesota called "What is Guild Medicine?" published in MINNESOTA MEDICINE, which every Minnesota debater should read.

Of course, facts and figures can be cited to prove or disprove any aspect of the problem of treating the sick. No matter how thoroughly they are studied they will not yield up the whole story about the delivery of medical care as the physician knows it.

It should therefore be the business of some physician in the communities where these debates are to be held to talk personally to the debaters.

Doctors Should Know

Most doctors can give information enough based upon their own experience in caring for the sick to show the folly and futility of any government system of medicine. It is for that reason that members have already been asked in every town to get in touch with school authorities at once and find out if the same school would enter the contest this year.

When the calendar for the ensuing year is made up, which should be within the next month, the names of this year's schools will be printed in these columns. It should then be the duty of at least one representative of the local medical society to get in touch with the debate coach and members of the teams.

Talking to Debaters

This representative should see that the debaters have an opportunity to study additional material supplied by the state association. He should also take the time to talk to the students. He should take them, if feasible, to the local hospital to show them first hand the expensive requirements of modern medical care and tell them about the distribution of medical care in their own communities.

Their Own Neighbors

Is there any lack of good facilities for care in their own communities? Is there anybody who needs and wants care who is not getting it and why? Would state medicine help the situation among their own neighbors. If possible, they should be shown in a specific case how the problem of securing adequate medical care is only one phase of the much larger problem of securing sufficient food and adequate housing, that good health cannot be purchased by any system in the world unless good food and adequate living are also assured.

It is hoped that medical men everywhere will take a personal interest in these debates.

They should not be allowed to slip by unheeded and unassisted. Otherwise what is there to prevent the creation of a great new mass of articulate public opinion in favor of radical changes in the practice of medicine? The debaters are school boys and girls. But those who hear them are not school boys and girls but voters, and all will have their influence in time to come.

Relief and WPA

It has been well known for some time that the Federal Relief Administration planned to withdraw federal funds from all direct relief this fall.

The storm that broke in newspaper headlines late in September when a public statement from Administrator Harry Hopkins definitely set the date for withdrawal for November 1 was apparently based upon false hopes of compromise when the time arrived.

Physicians were warned in these columns some time ago that relief, as it affects medical care, would shortly be on a quite different basis and that medical men, through their county Committees of Three, should get into immediate touch with local officials so that a definite and satisfactory understanding might be reached about medical care for those who will not benefit by the new WPA program.

Only for Unemployables

Direct relief will continue to be administered by the SERA in counties that have agreed to match the state funds appropriated for the purpose with funds of their own. It will be available only to those who do not benefit by the WPA program, however. That means that it is available only to those who are not employable and therefore do not receive WPA wages.

According to present regulations and outlook, medical bills of those who are receiving WPA wages will be the responsibility of the WPA worker and paid out of his wages at his own discretion.

Only moral suasion can be brought to bear upon these workers to pay their bills.

Danger Involved

In counties that have refused to accept the state aid which involves a matching appropriation by the county, care of the unemployed indigent will be the responsibility of the county or township boards involved. In these counties, especially, there is grave danger that conditions, as far as medical care of the indigent goes, may be far worse than before the federal relief program.

It remains for representatives of the local physicians to safeguard themselves and the care of the indigent in these localities by their own negotiations with county or town officials.

WPA by November 1

The number of employable relief clients already at work in Minnesota is comparatively small, but Mr. Hopkins and Mr. Victor Christgau, state director of WPA, predict that 90 per cent of these workers will be at work and receiving wages of from $40 to $90 a month by November 1, the date set for federal withdrawal from direct relief.

By that date, therefore, physicians who signed the cards sent them from the office of the Minnesota State Medical Association indicating their willingness to participate in the care for injured WPA workmen, should be receiving occasional calls for their services for such injuries.

Instructions Mailed

Requirements and regulations for this service were printed last month in these columns and were sent to every member from the state office during the last month. Approximately 650 medical men from all over the state had sent in their cards when this issue went to press. The names of these men with all pertinent information will be kept on file at WPA headquarters and distributed to the officials in charge of WPA projects in all the nine WPA districts of the state.

By order of the officials in charge, injured workers will be allowed the physician of their choice provided he is available. A regulation of the United State Employees' Compensation Commission, under the jurisdiction of which medical care and compensation for injured workers was definitely placed by the last Congress, provides that the work be distributed as equitably as possible among eligible physicians and that a list of names be kept in each district in order that the work may be rotated.

Free Choice

The ruling with regard to choice of physician on the part of the injured workman is a state ruling and will be observed within the spirit of the above regulation of the United States Commission.

> In the words of the Minnesota officials:
>
> "The welfare of the patient is the first consideration of the administration. If the patient's choice of physician is available he is the one who will be authorized to treat the injury."

The doctor will be paid for this service in accordance with the minimum fee charge for the type of service rendered in the local community.

He will draw his bill for services rendered on a standard voucher form (S-69) and will forward it to the District Office of the Works Progress Administration for certification. The voucher will then be transmitted to the Commission.

Monthly Vouchers

In most cases the voucher should be prepared at termination of the illness, or, in cases of protracted disability, it will be to the advantage of the physician to submit his vouchers monthly.

The United States Employees' Compensation Commission, which pays the bill, will be the court of final appeal as to the fairness of the amount charged.

A recent special bulletin from the Compensation Commission notes that many physicians have been submitting vouchers and bills for this work direct to the Commission in Washington. Says the bulletin:

> "This procedure should be discouraged since it results in unnecessary delay and expense occasioned by the necessity of returning such vouchers for endorsement by the Local Compensation Representative or the Official Superior of the employe, as the case may be."

As directed in the letter of instructions that went to all members the vouchers, Form S-69, should be submitted to the Local Compensation representative or, in the case of Federal establishments, to the Official Superior of the injured employee, who in turn should see that the services were authorized, charges itemized on the voucher, signatures are proper before authorizing the voucher and returning it to the Commission in Washington for payment.

Following is a list of WPA districts in Minnesota, with the location of their district offices and the names of district directors and compensation representatives.

District 1.—Carlton, Cook, Itasca, Koochiching, Lake, St. Louis
Headquarters—Duluth
District Director: FRANCIS DACEY, 132 E. Superior St., Duluth

District 2.—Aitkin, Anoka, Cass, Chisago, Crow Wing, Hubbard, Isanti, Kanabec, Mille Lacs, Morrison, Pine, Todd, Wadena
Headquarters—Brainerd
District Director: A. T. GILBERTSON, 2nd Floor N. P. Depot, Brainerd

District 3.—Ramsey
Headquarters—St. Paul
District Director: F. M. RARIG, JR., Court House, St. Paul, Minn.

District 4.—Dakota, Dodge, Fillmore, Freeborn, Goodhue, Houston, Le Sueur, Mower, Olmsted, Rice, Scott, Steele, Wabasha, Waseca, Washington, Winona.
Headquarters—Rochester
District Director: H. C. THEOPOLD, Old Post Office, Rochester

District 5.—Hennepin
Headquarters—Minneapolis
District Director: MAURICE A. FITZGERALD, Metropolitan Bank Bldg., Minneapolis

District 6.—Benton, Carver, Kandiyohi, McLeod, Meeker, Renville, Sherburn, Sibley, Stearns, Wright
Headquarters—St. Cloud
District Director: R. R. ROSELL, c/o WPA Office, St. Cloud

District 7.—Becker, Beltrami, Clay, Clearwater, Kittson, Lake of the Woods, Mahnomen, Marshall, Norman, Ottertail, Pennington, Polk, Red Lake, Roseau, Wilkin
Headquarters—Detroit Lakes
District Director: DONALD WHITMORE, c/o WPA Office, Detroit Lakes

District 8.—Big Stone, Chippewa, Douglas, Grant, Lac Qui Parle, Pope, Stevens, Swift, Traverse, Yellow Medicine
Headquarters—Morris
District Director: HARRY PHINNEY, c/o WPA Office, Morris

District 9.—Blue Earth, Brown, Cottonwood, Faribault, Jackson, Lincoln, Lyon, Martin, Murray, Nicollet, Nobles, Pipestone, Redwood, Rock, Watonwan
Headquarters—New Ulm
District Director: LINUS GLOTZBACH, c/o WPA Office, New Ulm

Wadena's Plan

Much good may eventually come out of experience with medical relief of the last two years if the energy with which physicians of Wadena in Wadena county have gone about solving their local problem is any indication.

Wadena county is one of the group of twenty counties that have elected to take care of their own relief problems in preference to participating with a large contribution of funds to State Relief.

That means, of course, that medical care of indigents becomes the local problem of the township of Wadena, Wadena being on the township rather than the county plan of care for the poor.

It might have meant, also, that Wadena physicians would return to the too prevalent lack of system by which they often cared for county or township charges with little or no hope of remuneration.

Satisfactory to Town Board

What actually happened was that the physicians called a meeting with the town board. They talked the matter over thoroughly and hit upon a scheme which is satisfactory alike to the officials and to the doctors and which has been working smoothly for some months now.

By this agreement, the town board pays the physicians 60 per cent of their regular fee for cases certified to them by the boards. The physician in his turn collects the other 40 per cent or some part of it from the patient.

Thus the fees are kept to the proper standard in the community; those who are able to pay a little for their care are not pauperized and those who have been in the habit of "enjoying poor health" at the expense of someone else will be discouraged from running to the doctor for trifling illnesses.

Physicians all over Minnesota will look with interest to the experiences of medical men in the counties that have refused to enter the SERA for care of the relief patients in handling this difficult problem of return to more nearly normal conditions.

Much may hang upon their success or failure in this critical time.

Survey

With the withdrawal from direct relief of the Federal Government, the problem of relief, particularly of medical relief, is in no way simplified.

The difficulties that have confronted the relief administration in its handling of medical relief in the two years since the Federal government authorized use of federal funds to pay for home care of relief clients will not be diminished with the return of direct relief—to state and county funds. Thus the services of the Committees of Three in Minnesota will be needed in these next few months more than ever before.

Roughly those difficulties come under the following heads:

Problems

1. The problem of determining what constitutes emergency illness (the only kind for which care was previously authorized in the famous Bulletin No. 7).

2. The problem of lack of provision for hospital care. In all but a few instances where a special local provision was made, hospitalization has depended upon already existing charitable institutions and unrecompensed private institutions. That these facilities were usually totally inadequate and greatly handicapped the doctor who was trying to give adequate service is well known to every medical man.

3. Lack of provision for preventive medical care. Prevention of disease is intimately concerned with adequate food and housing and good health education as well as with immunization measures and the treatment of disease in its early and relatively benign stages. The relief set up often had to be interpreted to provide only for true emergency illnesses and for the barest subsistence in food and living without regard to future health and development.

All these and other purely administrative complications were noted in a survey just completed by the Committee on Medical Care in Community Health of the American Association of Medical Social Workers. They have stood in the way of economy and effectiveness of the program of the last two years.

Medical Committees Help

It was found by the medical social workers, however, that medical relief was much more thorough-going and satisfactory in the localities, rural or urban, where a committee of medical men remained in active touch with relief officials to advise them as to medical needs and preventive measures.

The localities selected for the Medical Social Workers' survey did not include Minnesota.

It happens, however, that such committees are organized in each county in Minnesota and, where they have been active, medical relief work has been carried on as efficiently as possible within the limits of federal regulations.

Advice Welcomed

Relief officials are willing to accept the help and advice of these committees. There is no doubt whatever that their presence where they function actively is the best possible insurance, so far as the medical profession is concerned, not only of protection for the physician but for effective economical care for relief clients. They are especially needed now, in counties that will assume care of their own indigent after November 1.

Here, at least, is an opportunity to profit by SERA experience. The interest of the patient is always identified with the interest of the doctor, himself. There is always the possibility that hospital services can be liberalized and physicians allowed more leeway in determinations of preventive measures and emergency treatment. These are matters for the Committees of Three to consider.

New Policy

A new policy has been directing the Summer Round-Up of the Children as conducted this year by the Minnesota Congress of Parents and Teachers.

In accordance with this new policy, clinics for the examination of the children have been abandoned in some places altogether. In other localities the clinics have been considerably curtailed. Parents have been urged to send their children to the family doctor for examination and correction of defects.

This policy was adopted after conference between officers of the Parent-Teacher Association and representatives of organized medicine who have found considerable to disapprove in the clinic plan for getting pre-school children to the doctor before they start to school.

Fewer Children Examined

Results in numbers of children examined and in numbers of defects corrected have been disappointing this year in comparison with previous years, according to an unofficial preliminary report from Mrs. C. L. Hayes of St. Paul, Summer Round-Up chairman.

That fewer children were examined under the new policy should not be surprising. It is far easier to gather the children for a clinic at the school than it is to persuade mothers to take their children to their own doctors' offices.

Often parents object to paying the small fee charged even when they are well able to pay it. They fail to see the necessity for spending two dollars to have the doctor look at an apparently healthy child. On the other hand, they do not wish the Parent-Teacher Association representative to arrange for a free examination on the ground that they are unable to pay the doctors' fee. Thus the child goes unexamined.

Education Essential

To educate such parents to the necessity for a thorough examination in the doctor's office will require more effort than ever before. In point of fact, local chairmen for the Summer Round-Up who met at the call of Mrs. Hayes a short time ago have recognized that fact and are planning for a special week of newspaper and radio publicity before the opening of the campaign next spring. They hope to extend their radio publicity beyond the week in order to impress upon parents the importance of the physical examination, of vaccination, diphtheria immunization and correction of defects.

Exact figures for the campaign of 1935 are still lacking. In 1934, however, 3,170 of the 4,854 children who entered school for the first time in the 206 congressional districts registered for the campaign in Minnesota, were examined. Among these children, 4,229 defects were discovered, 1,643 of which were corrected. Vaccinations against smallpox were done for 611 of the children, and 725 were immunized against diphtheria.

Obligation of Physicians

The figures for the present year will be much smaller according to Mrs. Hayes, though here and there where the Round-Up was undertaken for the first time this year and where there had been no precedent of clinics in previous years, an excellent record has been reported.

Obviously physicians are under obligation to assist in every possible way to make this new policy a success. It is, of course, to their interest as medical practitioners. But it is also to the interest of the children, themselves, since a cursory inspection, which is all that clinic conditions permit, cannot be called a real examination and it does not serve to introduce the children and their parents to the value of continuous medical supervision.

Watch!

News from other states indicates that a variety of suggestions are coming from all sides for state health projects that meet with official approval and secure for the individual states the maximum amount available out of the federal allotments that will eventually come out of the appropriations for the Social Security Act.

These suggestions come often from national lay groups interested in the control of certain diseases or from local lay groups.

At the same time, a considerable number of WPA projects have been approved throughout the country involving surveys of health and medical services for special groups such as the "physically handicapped" and the deaf.

Whether or not these surveys will be of value will depend upon how closely they are supervised by medical men.

There is no doubt in the minds of the Legislative Committee of the American Medical Association that medical care in various phases will be discussed on the basis of availability, adequacy and quality in many quarters. Results will be used by many persons to draw conclusions and propose remedies.

Constant watchfulness is urged upon county and state societies to check on these surveys and upon the actual extent and quality of all services offered in their communities.

It is quite possible that some of these surveys will be inadequate and unfairly conducted. They should be met by immediate studies of the conduct of the survey and the sources of misleading findings to offset possible propaganda making material that is false and harmful. Medical societies should be ready to controvert unfounded statements.

"The weakest medical units, be they individuals or organizations, may determine the reaction of the lay public toward physicians," says Dr. R. L. Sensenich in a bulletin from the committee. "It will be said that they are stubborn and selfish. Past years of unselfish service must be brought forward to meet that accusation. The profession may well be proud of its background of brilliant achievement and there must be no basis developed upon which it may be charged that the level of medical service offered to the average man is below desirable standards by reason of negligence or incompetence of medical men."

Shoulder to Shoulder

The British Columbia and the Canadian Medical Associations stand shoulder to shoulder with the American Medical Association in their opposition to government supported sickness insurance.

Dr. J. C. Meakins, Montreal, president of the Canadian Medical Association, told members of the British Columbia Association so at a banquet held before the last named association recently and reported under a Vancouver date line.

Concerning a draftbill for sickness insurance on which the provincial government is at present inviting and hearing representations, Dr. Meakins said:

"Stand together shoulder to shoulder, man to man, and defend our rights.

"We are attacked by a common front of political enmity. We are the last bulwark of society to go down. Now they are trying to pick us off and make us serve their selfish financial ends."

State Medicine—Glenn Frank

Dr. Glenn Frank, president of the University of Wisconsin, was slated to talk on tuberculosis before the Mississippi Valley Conference on Tuberculosis and the Mississippi Valley Sanatorium Conference at Madison, Wisconsin, recently.

The high point of his talk as reported by Madison newspapers was not on tuberculosis, however. It was a warning against State medicine.

Said Dr. Frank:

"State medicine will not come if doctors generally and health agencies do more to display adequate understanding of social values and adequate statesmanship in meeting problems . . .

"I dislike to see any activity fall into the hands of the government if it can be administered equally as well—or better—by the trade, profession or spontaneous organization of citizenship to which it belongs . . .

"The great insurance companies, industries and organized labor have all the necessary raw material for a system of State Medicine at hand, waiting,—"

"Will that raw material be used for state medicine or will the medical profession and allied agencies take the lead in meeting the needs which must otherwise be met by State Medicine?"

Doctors will welcome Dr. Frank's vigorous opposition to government administration of medical care. They will not wholly agree with him, however, that anything in the present condition of medical care demands a sweeping and drastic alternative to State Medicine.

"Insurance Studied"

That a "broad program for health insurance to round out the administration's sweeping social security system is being studied with a view to Congressional action next session" was asserted from Washington recently by the United Press.

Said the "U.P.":

"The social security act, designed to safeguard 25,000,000 working Americans against old age destitution and unemployment, failed to make provision for economic protection against sickness.

"One reason was the controversial character of proposed plans by which the ill worker could get medical treatment on a low cost, federally aided basis in return for a yearly contribution from his wages.

"Medical societies in many instances have charged it would 'regiment' their profession.

"A more detailed study of the problem is now being made by administration figures."

It should be noted parenthetically that "regimentation" is the least of the evils that medical societies look for in the event that federal sickness insurance should materialize.

"Doorbell Census"

From the headlines:

UNCLE SAM TAKES DOORBELL CENSUS

Washington, August 28 (By Associated Press).—Uncle Sam will start ringing doorbells October 15 to ask the family, "How's your health?"

The "doorbell census" is a federal project designed to employ about 6,000 white collar workers. The funds, $3,450,000 are to come direct from Federal Employment allotments.

The survey is to be under the direction of the United States Public Health Service and only certain selected states, of which Minnesota is said to be one, will participate.

The object is to find out how much communicable disease there is in the United States. Just how reliable data secured by house to house agents may be will depend upon how well trained and how closely supervised the workers are. Many physicians and health officers seriously question the usefulness of such a survey no matter how well supervised the workers.

Minnesota State Board of Medical Examiners

Medical Board Orders Investigation of Massage Parlors

The Minnesota State Board of Medical Examiners has conducted an investigation of a number of massage parlors, licensed and otherwise, in the City of Minneapolis. This investigation discloses that several of these places have been operated in the past by women who hold no license to practice massage and in other places the Board has found that women who are licensed to practice massage have employed one and two girls in the massage parlor to give massage.

The women who are not licensed have been warned that a continuance of their places will result in a prosecution. Those who are licensed have been instructed to immediately discontinue using unlicensed masseuses for this purpose under penalty of having their massage license revoked.

The practice of massage was not regulated by law in Minnesota until the legislature of 1927 enacted a massage law setting up an examining board in this field. In 1929 the law was repealed and the licensing and regulating of massage was placed under the State Board of Medical Examiners. The Board has no intention of interfering with the practice of massage by reputable persons. It does intend, however, to institute prosecutions against those individuals who are not licensed and it will discipline those who are licensed who attempt to evade the law by employing unlicensed women in their place of business and who do not operate in accordance with the laws of this state.

St. Paul Chiropodist Pleads Guilty to Violating Basic Science Law

State of Minnesota vs. Arthur N. Alexander

Arthur N. Alexander, forty-three years of age, entered a plea of guilty on September 19, 1935, to an information charging him with practicing healing without a basic science certificate. The plea was entered before the Honorable John W. Boerner, Judge of the District Court of Ramsey County.

Alexander has been a licensed chiropodist in the State of Minnesota since 1917. Following repeated complaints to the State Board of Medical Examiners that he was exceeding the scope of his license, an investigation was conducted by the Board in coöperation with the County Attorney's office. Following the arrest of Peter H. Nellessen, who was sentenced on July 25, 1935, to four years at Stillwater, after his pleading guilty to the crime of abortion, it was discovered that one of the girls aborted by Nellessen had previously requested Alexander to perform an abortion upon her. Alexander made an examination for which he was paid the sum of $5.00, and according to the statement of this girl, attempted to perform an abortion upon her. The abortion was not successful and she later went to Nellessen. A complaint was filed against Alexander charging him with the crime of abortion and subsequently another complaint was filed against him charging him with practicing healing without a basic science certificate.

Alexander was arrested by the St. Paul Police Department a few miles from Rush City, Minnesota, on August 15. Upon being arraigned in Court his bail was fixed at $5,000, which he was unable to raise and he has been confined in the Ramsey County Jail since that time. Following Alexander's plea of guilty before Judge Boerner, he surrendered his chiropody license for cancellation by the Chiropody Board. In view of the fact that Alexander surrendered his chiropody license and has been in jail since the time of his arrest, Judge Boerner imposed a sentence of one year in the St. Paul Workhouse and placed Alexander in the custody of the Probation Officer for Ramsey County. Judge Boerner warned the defendant against attempting to practice healing in any manner in the future in the State of Minnesota. The Court also informed the defendant that if there was any complaint about his conduct in the future, he would have to serve his sentence.

The disposition of this case meets with the approval of the State Board of Medical Examiners, in view of the fact that Alexander surrendered his chiropody license. For some time this defendant has been using his chiropody license as a shield for his unlawful activities and the surrender of his license will deprive him of the right to maintain an office for the purpose of practicing healing and will deprive him of any excuse whatever for engaging in such practice in the future.

The Chiropody Board coöperated with the State Board of Medical Examiners in this case. At the time the warrant was issued for the arrest of this defendant, the Chiropody Board announced the suspension of Alexander's license and stated that in the event of his conviction it would be permanently revoked. The license and the 1935 registration card have been delivered to the Chiropody Board for cancellation.

PROGYNON-B AND THE OVARIAN FOLLICULAR HORMONE

The Council on Pharmacy and Chemistry reports that recently MacCorquodale, Thayer and Doisy of St. Louis University reported the isolation in crystalline form of an estrogenic substance from the follicular fluid of hog ovaries. Estrogenic compounds previously isolated, such as theelin and theelol, had been obtained from other sources, in particular the urine of pregnant women; a pure estrogenic preparation had not before been isolated from the ovary itself. Consequently, the actual constitution of the ovarian follicular hormone or hormones was not known. MacCorquodale, Thayer and Doisy reported that the crystalline product obtained by them from follicular fluid had approximately the same estrogenic potency as dihydroxyestrin (theelin is ketohydroxyestrin and theelol is trihydroxyestrin), that is, from four to eight times the activity of theelin. It appears from the preliminary report of these investigators that the only evidence at present available for considering the crystalline preparation from ovarian follicular fluid to be identical with dihydroxyestrin is the similarity of the estrogenic activity and of the melting points. This, of course, does not constitute proof from a chemical standpoint of the identity of the two preparations. Despite the paucity of the evidence at present available, the Schering Corporation has made claims in its recent advertising literature that Progynon-B (said to be the benzoate of dihydroxyestrin, which the firm calls "benzoic acid ester of dihydrofollicular hormone") is the "true female sex hormone, as was definitely proved by Doisy. . . ." Inquiry was made of Dr. Doisy as to the status of the preparations concerned. According to Dr. Doisy there is no definite evidence regarding the nature of the estrogenic substances of human ovaries. In Dr. Doisy's opinion the Schering claim of greater activity seems to be sound but has little significance. Dr. Doisy states further: "The claim of a synthetic compound is certainly not warranted, since the dihydro compound is prepared from the ketohydroxy compound by reduction of the carbonyl group. In other words, the chemist starts with the conjugated ring structure containing all the substituents in the correct position. Such a reaction does not correspond to the usual conception of synthesis." The advertising claims of the Schering Corporation for Progynon-B are therefore inaccurate and misleading. The Council voted that this report be published to correct the erroneous impressions created by the reprehensible advertising policy of this firm. (J. A. M. A., August 31, 1935, p. 676.)

In Memoriam

William W. Lewis
1876-1935

Dr. William Walter Lewis was born in Saint Paul, Minnesota, on June 9, 1876, the son of Margaret Barnes Lewis and John V. Lewis. He received his elementary education in the Saint Paul Public Schools and his medical education at the University of Minnesota, by which institution he was graduated in 1902 at the head of his class. His internship was served at the City and County Hospital, Saint Paul, where he became a lifelong friend of Dr. Ancker and was the mainstay of the eye, ear, nose and throat department from 1913 until his appointment to military service.

Beginning general practice in Saint Paul after his internship, Dr. Lewis became associated with the late Dr. James Quinn in taking care of the Great Northern and other railroad work. In 1912 he decided to specialize and gave up a well established practice to spend two years in postgraduate work in Vienna and Berlin. In 1913, he returned to Saint Paul and thereafter limited his practice to the eye, ear, nose and throat specialty. Almost immediately he developed a successful practice and loved his work, and his contact with people.

His medical society memberships included the Ramsey County Medical Society, the Minnesota State Medical Association and the American Medical Association and he contributed frequently to MINNESOTA MEDICINE. His contributions to medicine often took a critical line, deploring indiscriminate surgery, deprecating careless practice and lack of conservatism. On the other hand, although not slow to accept proven procedures, few men showed more pronounced dogmatism in practice or in teaching.

He was a past president of the Minnesota Academy of Ophthalmology and Otolaryngology, a member of the American Academy of Ophthalmology and Otolaryngology, and a Fellow of the American College of Surgeons. He was certified by the American Board of Ophthalmic Examinations and by the Otolaryngologic Board. For many years he has been a member of the medical faculty of the University of Minnesota and was an Assistant Professor of Ophthalmology at the time of his death. He was a 32nd degree Mason.

Dr. Lewis served during the World War as a captain in the Medical Corps and rendered valuable service in whatever capacity he was assigned. He was at several stations but the major assignment was as surgeon in charge of head surgery at the Government Reconstruction Hospital at West Baden, Indiana.

William Lewis was one of those intrepid individuals, forceful and courageous in his opinions, who could defend his strong convictions upon any occasion. He possessed a scrupulous integrity which was unshakable. He stood for nothing false or untrue. His patients learned to respect this great attribute and found his advice invariably sound, without personal motive, thoroughly for their best interest. In fact, no one could question that he held his patients' interests paramount.

He was straightforward, sincere and distinctly a humanitarian. No patient was refused his services because of poverty. Former patients who had seen better days, perhaps less fortunate in later years, received the same kindly attention which they previously commanded.

William Lewis was a loyal friend, made strong attachments, was quick to condemn any doubtful motives, but was as ready to correct any misjudgment of anyone. His passing marks the departure of a forceful-leading figure in ophthalmology in Minnesota.

He was married on March 22, 1909, to Barbara Haug of Duluth, Minnesota, who survives him as do his son, William Walter, Jr., and a daughter, Mrs. R. C. Trygstad of East Orange, N. J., as well as a sister, Mrs. F. E. Hough of Duluth, Minn., and two brothers, Harry S. and George J., both of Evanston, Illinois. His death occurred July 27, 1935.

Frank Wright Bullen
1869-1935

Dr. Frank W. Bullen of Hibbing, Minnesota, died suddenly on the golf course at Swan Lake, Minnesota, July 21, 1935.

Dr. Bullen received his education at the Michigan State College, Lansing, Michigan, and after attending the Chicago School of Pharmacy, he took his medical training at Rush Medical College, graduating in 1896.

After taking an eighteen months' internship at Cook County Hospital, Dr. Bullen became a resident physician at the Milwaukee Emergency Hospital. He spent a period at the More Hospital in Eveleth, Minnesota, and then moved to Hibbing, where he had been connected with the Rood Hospital since 1908.

Dr. Bullen served twelve years on the School Board of Hibbing and was coroner for fifteen years.

Arthur T. Caine

Dr. Arthur T. Caine, superintendent of the State Asylum at Anoka, Minnesota, died September 12, 1935, at the Eitel Hospital, Minneapolis, following a three months' illness.

Dr. Caine was born in Saint Paul in 1875. His father, Dr. William Harris Caine, moved his family to Stillwater where Dr. Caine graduated from high school. Dr. Caine received his medical degree from the University of Minnesota in 1900.

After practicing a year at Lake Preston, South Dakota, Dr. Caine moved to Anoka where he practiced until 1921 when he was made superintendent of the State Asylum, there replacing John Coleman, who was appointed to the State Board of Control.

Dr. Caine married Bertha Johnson of Stillwater in 1901. Mrs. Caine died in 1929 and two years later Dr. Caine married Frances E. Anderson of Superior, Wisconsin. He is survived by his widow and two children by his first marriage, Helen Barbara and William Harris Caine, II. Dr. William A. Caine of Stillwater is a brother.

OF GENERAL INTEREST

The annual meeting of the Minnesota State Medical Association will be held at Rochester, Minnesota, May 3 to 6, 1936.

* * *

Dr. George X. Levitt has opened offices at 538 Lowry Medical Arts Building, Saint Paul, for the practice of internal medicine.

* * *

Dr. W. C. Stillwell of the Mankato Clinic left September 21 for two months' study in Europe. He expects to do work in surgery in Vienna under the American Medical Association.

* * *

Mr. Richard Noren, who has been with the Immanuel Hospital of Mankato for many years, will leave shortly to take up his duties at the Ah-Gwah-Ching Sanatorium.

* * *

Dr. Frank E. Burch, Saint Paul, was recently installed as president of the American Academy of Ophthalmology and Otolaryngology at the meeting of the Academy held in Cincinnati. He succeeds Dr. Willis Eagleton of Newark, New Jersey.

* * *

The meeting of the Minnesota Society of Neurologists, held at St. Mary's Hospital, Duluth, September 14, brought a very notable and distinguished group of celebrities to the Head of the Lakes. Many remained over to absorb enough of the local atmosphere so that they might the more readily be distinguished from their patients!

* * *

Dr. Owen H. Wangensteen of the University of Minnesota Medical School has been awarded the Samuel D. Gross Prize for 1935 for his essay entitled "The Therapeutic Problem in Bowel Obstruction." The prize of fifteen hundred dollars is awarded each five years by the Philadelphia Academy of Surgery for the best original essay on some subject in surgical pathology or surgical practice.

* * *

Prof. W. J. Bleckwenn, of the university faculty at Madison, Wisconsin, appeared before the Interurban Academy of Medicine on the evening of September 25, at the Hotel Androy at Superior. The doctor's discussion upon the subject, "The Diagnosis and Treatment of Head Injuries," met with much discussion and an enthusiastic reception. It is apparent that the frequency of road accidents has not only produced an appalling incidence of general accidents, but pits every physician against most serious judgments involving the central nervous system.

* * *

The resorts of Northern Minnesota report a decided improvement in business this season. Perhaps doctors are doing a little better than for a few years back because they are among the most acceptable and popular patrons wherever outing facilities are featured. In Napoleon's time it was said you could not throw a cat out of a window in Vienna without hitting either a soldier or a priest. "Cataphorically" speaking, one might easily launch a similar quip about the ease of casting your dowagiac into the whiskers of a medic around any good bass, grass-rimmed lake, anywhere in Northern Minnesota!

* * *

Kansas City is already alert, with its medical emissaries propogandizing for the American Medical Association convention in their city May 16 next. These men present enough subtle argument to make one feel that our Minnesota contingent should go down there in full strength. They are an unusually agreeable, socially minded and aggressive group of doctors. For one thing, their hospitals average among the best autopsy records, year by year, for our entire country. They are planning very well, indeed, and Kansas City is one of our most delightful American cities.

* * *

A special program of lectures and demonstrations in medicine will be held under the direction of The Mayo Foundation from November 11 to 15, inclusive. Mornings will be devoted to surgical and medical clinics. In the afternoons and evenings symposiums will be conducted on gastro-enterology, postoperative chest complications, hematology, diseases of the rectum and anus, treatment of syphilis, some aspects of endocrinology, and physiotherapy, including fever therapy. In addition, one clinico-pathologic conference will be held. While this program is arranged primarily for the Fellows of the Foundation, visiting physicians are invited to attend.

* * *

Dr. Morris Fishbein of Chicago, editor of the *Journal of the American Medical Association,* will address a Councilor District Medical meeting, to be held in St. Cloud, November 21, in honor of President-elect Will of Bertha, and Dr. E. J. Simons, Ah-Gwah-Ching, newly elected Councilor of the district.

Members of Wright County, Stearns-Benton, Upper Mississippi, Red River Valley, Clay-Becker, Kandiyohi-Swift-Meeker, and East Central Minnesota Medical Societies will be invited. State officers and committee chairmen of the State Medical Association will be present.

There will be a dinner followed by a medical meeting to which members of the Auxiliary, dentists, druggists and physical education directors will be invited.

At the same time the Stearns County Public Health Association and the Minnesota Public Health Association will hold a public meeting. Dr. Fishbein and Dr. J. A. Myers of Minneapolis will address both meetings.

Dr. C. B. Wright of Minneapolis and Dr. S. A. Slater of Worthington are also on the program for the medical meeting.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for October

The Minnesota State Medical Association Morning Health Service

The Minnesota State Medical Association broadcasts weekly at 11:15 A. M. every Tuesday over Station WCCO, Minneapolis and St. Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month will be as follows:

October 1—Dysentery.

October 8—Community Nursing Needs.

October 15—Appendicitis.

October 22—Water and Health.

October 29—Dental Care.

Northern Minnesota Medical Association

At the annual meeting of the Northern Minnesota Medical Association held in Duluth, August 12 and 13, Dr. Arthur N. Collins of Duluth was elected president for the ensuing year to succeed Dr. G. I. Badeaux. Dr. O. F. Melby, Thief River Falls, was elected vice president and Dr. O. O. Larsen, Detroit Lakes, was reelected secretary-treasurer. The next meeting will be held in 1936 in Fergus Falls.

Scott-Carver County Society

The annual meeting of Scott-Carver Society was held at Mudbaden on Tuesday, September 10. The following officers were elected for the coming year: President, W. H. Phillips, Jordan; vice president, C. J. Olson, Belle Plaine; secretary, E. R. Crow, Arlington; delegate, E. E. Novak, New Prague; censor, G. T. Schimelpfenig, Chaska.

The following were guest speakers:

Dr. Owen Wangensteen, Minneapolis, spoke on the subject of acute abdominal conditions.

Dr. Fred Foley, St. Paul, described an improved operation for ureteral stone.

Dr. J. F. Briggs, St. Paul, gave a very comprehensive discussion on the subject of achlorhydric anemia.

A dinner was served at six-thirty in the spacious Mudbaden dining room.

University Extension Course in Refraction

So much interest was shown in the four weeks' course in refraction given by the University Department of Ophthalmology during the month of April that the course will be repeated from November 4 to 30. Only ten applicants will be admitted and the course will require the full time of each student. Only practicing physicians will be enrolled. In addition to formal instruction in refraction opportunity will be afforded to examine patients at the Wilder Foundation and Ancker Hospital out-patient department in Saint Paul and at the University and Minneapolis General Hospital out-patient clinics. The fee for the course will again be $80.00, payment of $50.00 to be made at time of application and $30.00 at the beginning of the course. Further information may be obtained from Dr. R. R. Price, Director of University Extension, University of Minnesota, Minneapolis.

Extension Education in Physical Therapy

One of the aims of the Council on Physical Therapy of the American Medical Association is to promote extension education in physical therapy.

The Committee on Education of the Council believes that one of the best ways of extending postgraduate instruction in physical therapy is to arrange for practical talks to be given before state, county or other medical societies. Experience, especially in New York and Pennsylvania, has shown that such programs are eagerly received by the profession.

The Council is prepared to assist medical societies by furnishing general advice as to programs and by suggesting qualified personnel.

The following topics are offered as being of interest to the general practitioner:

The Present Status of Physical Therapy
Physical Therapy in General Practice
Body Mechanics and Posture Training
Massage—Indications and Effects
Pathological Conditions Helped by Physical Therapy
Therapeutic Exercise
Radiation Therapy
Hydrotherapy
Fever Therapy
Diathermy, Medical and Surgical, Including Short Wave

Motion pictures on the following subjects are available for loan:

Massage—Technic
Graduated Active Motion
Occupational Therapy
Effects of Heat and Cold on Blood Circulation
Effects of Massage on Blood Circulation

In addition, exhibits on physical therapy can be arranged in conjunction with the Committee on Scientific Exhibit, available on request.

Anyone desiring help in program planning or loans of films or exhibits is advised to write the Secretary, Council on Physical Therapy, A. M. A., 535 North Dearborn Street, Chicago, Illinois.

MINNESOTA STATE MEDICAL ASSOCIATION

Eighty-second Annual Meeting

Minneapolis

PROCEEDINGS OF THE HOUSE OF DELEGATES

First Meeting

Sunday Evening, June 23, 1935

The opening session of the House of Delegates, held in connection with the Eighty-second Annual Meeting of the Minnesota State Medical Association, Minneapolis, convened at 7:15 o'clock, Dr. W. A. Coventry, President, presiding.

The Chair appointed a Credentials Committee, consisting of Dr. O. E. Locken, Crookston, chairman, Dr. J. R. Aurelius, St. Paul, and Dr. B. F. Davis, Duluth. Dr. Locken reported that there were thirty-seven delegates present.

The minutes of the last meeting were accepted as published in MINNESOTA MEDICINE.

Dr. H. M. Workman, chairman of the Council, asked Secretary Meyerding to read the Report of the Council.

REPORT OF THE COUNCIL

The first Council meeting, held in connection with the Eighty-second Annual Meeting of the Minnesota State Medical Association, Minneapolis, convened at 9:40 a. m., Sunday, June 23, 1935, with Dr. H. M. Workman, Tracy, presiding.

Those present were:

Dr. W. A. Coventry, President, Duluth.
Dr. E. A. Meyerding, Secretary, St. Paul.
Dr. F. J. Savage, Immediate Past President, St. Paul.
Dr. H. Z. Giffin, Rochester, First District.
Dr. L. L. Sogge, Windom, Second District.
Dr. H. M. Workman, Tracy, Third District.
Dr. I. S. Holbrook, Mankato, Fourth District.
Dr. G. A. Earl, St. Paul, Fifth District.
Dr. J. M. Hayes, Minneapolis, Sixth District.
Dr. W. W. Will, Bertha, Seventh District.
Dr. W. L. Burnap, Fergus Falls, Eighth District.
Dr. B. S. Adams, Hibbing, Ninth District.

Guests:

Dr. C. B. Drake
Mr. F. M. Brist
Dr. W. F. Braasch
Mr. J. H. Baker
Dr. S. H. Boyer

The minutes of the last meeting were approved.

It was moved by Dr. Hayes, seconded by Dr. Will, and carried, that the report of MINNESOTA MEDICINE be accepted.

With reference to the report of the Fiscal Agency, Dr. Giffin asked whether the Council wished to continue investing in government bonds. It was moved by Dr. Sogge, seconded and carried, that the matter be left in the hands of the Finance Committee, to invest in the way they should see fit.

Secretary Meyerding announced that Treasurer Condit asked that the reading of the finance report be postponed until the Tuesday meeting. The members discussed the statement of cash receipts and disbursements, and it was moved by Dr. Giffin, seconded and carried, that the item "total receipts" be starred, and at the bottom of the page these words be inserted: "This amount includes advance collection of dues for 1935."

The members discussed the budget expenditures to June 1, and it was accepted by consent.

Dr. Giffin, in making the report of the Finance Committee, suggested that the report be deferred until a later time, as the committee wished to consider a budget very carefully and report later. The Council accepted the suggestion, by consent.

Secretary Meyerding suggested that the members of the Council visit the hobby show in connection with the annual meeting, to see if they want to continue that type of show.

Secretary Meyerding outlined the membership standing of the Association, and the members discussed it.

Secretary Meyerding announced that no amendments to the Constitution or By-laws had been proposed.

The members discussed affiliate membership, and it was moved by Dr. Earl, seconded and carried, that the chairman appoint a committee to study the question of junior membership, with the idea of making a reduction for the younger members. Chairman Workman announced that the Affiliate Membership Committee would be continued to make that study, and that Dr. Savage would be added to the committee. It was moved by Dr. Coventry, seconded and carried, that the committee, in conjunction with Dr. Savage, prepare an amendment to the Constitution and present it before the meeting adjourns, with reference to the age limit on affiliate memberships.

Dr. Giffin, as chairman of the SERA Committee, asked that all Council members who could, attend a meeting on this subject Thursday morning at nine o'clock at the Federal Building in St. Paul.

Dr. Savage reported on a letter he had received from Dean Scammon regarding the University Hospital. It was moved by Dr. Sogge, seconded and carried, that the Councilors be presented with a copy of the report and that the report be accepted.

Dr. Braasch reported for the subcommittee of the Committee on Medical Economics, to study the limitation of the number of physicians to be licensed in Minnesota. It was moved by Dr. Coventry, seconded and carried, that the subcommittee be abolished.

Mr. Brist gave a report on his investigations with regard to the degree of "Doctor of Public Health," giving the information that there is no law in the state of Minnesota that recognizes this so-called degree. It was moved by Dr. Coventry, seconded and carried, that the report be received and a copy of it be filed for official reference and a copy be sent to the Committee on State Health Relations.

It was moved by Dr. Adams, seconded and carried, that Dr. J. T. Christison, delegate to the American Medical Association, and Dr. E. A. Meyerding, alternate, whose terms expire in 1935, be nominated for re-election.

It was moved by Dr. Savage, seconded and carried, that the report of the Council to the House of Delegates on the matter of the nomination of a delegate to the American Medical Association in place of Dr. H. M. Johnson, whose term expires in 1936, be that the Council recommends that the House of Delegates refer the matter back to the Council for further consideration and action.

Application of Dakota County Medical Society for a charter was presented, and Dr. Earl reported on the society and moved that they be granted a charter. The motion was seconded and carried.

The meeting recessed at twelve-fifteen o'clock.

The Council re-convened Sunday afternoon.

The Council authorized Dr. Savage to appoint a subcommittee from the University Relations Committee, to meet with Dr. Mayo and Dr. Hagen.

It was moved by Dr. Coventry, seconded by Dr. Earl, and carried, that Secretary Meyerding arrange a committee of three, from outside of the state if possible, to act as judge of the scientific exhibits.

Dr. Boleyn made a supplementary report for the Public Health Nursing Committee, and, with regard to vaccination and immunization, said he thought a plan should be established so it can be done uniformly, whether done in schools or elsewhere, so the charges made for it will be uniform.

Dr. Armstrong read a supplementary report for the Historical Committee. It was moved by Dr. Coventry, seconded by Dr. Savage, and carried, that the Historical Committee be empowered to proceed and finish their compilation for printing, and submit it to the publishers for a price, and that they refer it back to the Council, with the information as to the costs and all estimates complete.

The meeting recessed at two-thirty o'clock.

The Council reconvened at 5 o'clock to hear the report of the Reference Committee.

It was moved, seconded and carried that the report of the Reference Committee be accepted.

Dr. Braasch wished to correct the minutes of the Council Meeting, and stated that he had suggested that a subcommittee be appointed under the Committee on Medical Economics, for the purpose of studying the subject of malpractice insurance, but that his suggestion incorporated the statement that the matter be referred to the Council for action. The minutes were accepted as corrected.

COMMITTEE REPORTS

In accordance with the recommendation of the Reference Committee, the following reports were accepted by the House of Delegates:

REPORT OF COUNCILORS

The following Councilors reported that conditions are satisfactory in their respective districts:

Dr. H. Z. Giffin	First District
Dr. L. L. Sogge	Second District
Dr. H. M. Workman	Third District
Dr. J. S. Holbrook	Fourth District
Dr. G. A. Earl	Fifth District
Dr. J. M. Hayes	Sixth District
Dr. W. W. Will	Seventh District
Dr. W. L. Burnap	Eighth District
Dr. B. S. Adams	Ninth District

REPORT OF THE PRESIDENT

Dr. Coventry presented the report of the President, which contained an appreciation of the coöperation of the Executive Office and comments upon Dr. Meyerding's ability and coöperation, together with an appreciation of the diligent work of the Council. The President remarked that the deviation from the usual program of having speakers from out of the state was not intended to establish a precedent, but was presented as a diversion from the regular procedure and as a courtesy to the American Association for the Advancement of Science. Dr. Coventry included in his report a report of the Regional Conference.

Dr. W. F. Braasch, Dr. J. T. Christison, and Secretary Meyerding presented reports as Delegates to the American Medical Association.

President Coventry paid tribute to Dr. H. M. Johnson, deceased, and at the conclusion of his remarks the members of the House of Delegates stood with bowed heads for one minute, in respect to the memory of Dr. Johnson.

Dr. G. A. Earl, St. Paul, suggested that a committee of three be appointed to draw up an appropriate resolution concerning the death of Dr. Johnson. President Coventry stated that he did not believe it necessary to take formal action, inasmuch as no one would dissent, and that he would appoint such a committee, to report to the meeting of the House of Delegates on June 25, 1935.

Dr. M. C. Piper, Rochester, read the report of Secretary Meyerding, prefacing the reading of the report by stating that the Reference Committee had deemed the report such an able exposition of the year's work as to warrant its being read before the House of Delegates.

REPORT OF THE SECRETARY

The Secretary's report touched upon highlights of the year's work, including:

Committee of Three.—The Medical Advisory and Contact Committee organized during the year in practically every county for the purpose of consulting in a representative capacity with local administrators of relief. In time they should take on the function of local representatives of the medical profession in all public contacts.

Medical Economics Committee.—The facilities of the State Office have continued to be at the service of the Committee on Medical Economics under the chairmanship of Dr. Braasch, which has edited for more than a year the medical economics section of MINNESOTA MEDICINE, a section which has been started in several state journals following Minnesota's lead.

Eighty-Second Annual Meeting.—Attention was called to the new program policy used this year and made possible by the unusual character of the meeting. Appreciation was expressed to the special societies which sponsored guest speakers.

County Officers' Meeting.—This meeting, occurring a few days after the special meeting of the House of Delegates of the American Medical Association, provided special opportunity for the discussion of action taken. The Secretaries' breakfast, held for the second time, proved most valuable.

Northwest Medical Conference.—Representatives of fourteen states attended this meeting.

News Service.—The newspaper service of the Public Health Education Committee continues to be distributed throughout the state under the auspices of the Minnesota Editorial Association.

Committee on Maternal Welfare.—A new committee headed by Dr. Robert Mussey of Rochester, which will participate in the nation-wide effort on the part of the medical profession to study and lower the maternal death rate, was formed.

Malpractice Suits.—Six meetings of Councilor Dis-ricts or county societies were held to discuss rising ates on malpractice insurance.

Council.—The Council has met four times and the hree in connection with the annual meeting and the egular fall meeting will make a total of eight for the ear. The Emergency Advisory Committee of the ouncil, created this year, has relieved the Council of onsiderable work. This committee was created to act s an authoritative advisory group to assist in deternining policies upon important matters that present hemselves. The Finance Committee is making a comlete survey of the program and activities of the Assoiation looking to a possible re-organization of the udget. Medical relief has continued to be administered under the simple and elastic rules in Federal Bulletin No. 7 with reasonable satisfaction to all.

The sale of the booklet on diabetes, the organization of a medical economics course at the University of Minnesota Medical School beginning next year, and the permission of the Council for Dr. W. A. O'Brien, radio speaker for the Association, to speak once a month under the auspices of the Dental Association, were also reported on.

COMMITTEE ON PUBLIC HEALTH EDUCATION

Dr. L. R. Critchfield, chairman, gave the report of the Committee on Public Health Education, outlining a departure in public health education begun during the past year. This was the establishment of a medical lecture course for teachers' colleges and training schools, carried on with the coöperation of the Minnesota Public Health Association. A series of four and five lectures was given at each of five State Teachers' Colleges.

A survey was made to discover whether local physicians were equipped to do immunization work which a federal program might call for, if the Social Security Bill provided funds. Results showed that for the most part local physicians were so equipped.

The regular services of the committee during the past year, including the weekly newspaper service, reaching 470 members of the Minnesota Editorial Association, 648 health talks to lay groups, continuance of the speakers' library, coöperation in the publication of *Everybody's Health,* coöperation in the 4-H club health contests, assistance in publication of public health education material such as the health diary, first-aid manual, and "Handbook of Health," and assistance to the Women's Auxiliary in providing speakers and in advice in general, are designed toward the education of the public to the proper and complete use of medical services as they are now functioning in America.

Dr. J. C. Hultkrans, chairman of the Reference Committee, read the report of the Reference Committee, which complimented members of the Committee on Public Health Education upon their diligence.

COMMITTEE ON STATE HEALTH RELATIONS

The report of the Committee on State Health Relations, Dr. T. H. Sweetser, chairman, stated that the assurance of Dr. Chesley, of the State Board of Health, had been secured that he will be glad to work with the committee in establishing immunization procedures if a campaign is made possible by the Social Security Bill.

The Reference Committee recommended close coöperation between the local societies and the committee, in establishing immunization procedures.

EDITING AND PUBLISHING COMMITTEE

Dr. J. T. Christison, chairman, presented the following report of the Editing and Publishing Committee: Due to an increase amounting to over 10 per cent in advertising and a slight increase in the revenue from subscriptions during the past year, the net cash surplus derived from MINNESOTA MEDICINE was considerably larger than for the previous year and a slightly larger journal has been made possible. The outlook for the coming year indicates a substantial increase in advertising volume, assuring a larger income for the year and a larger journal than has been possible for the past two or three years.

Dr. Christison suppplemented the original report by commenting upon the progress of MINNESOTA MEDICINE, with particular reference to the Section on Medical Economics. Dr. Christison stated that the committee felt keenly the loss of Dr. Arthur Hamilton, of Minneapolis, who had not been active in the affairs of the committee because of illness.

RADIO COMMITTEE

The Radio Committee, of which Dr. S. R. Maxeiner is chairman, reported forty-three radio talks given over WCCO between June 15, 1934, and June 1, 1935, with Dr. William A. O'Brien, Associate Professor of Pathology and Preventive Medicine, University of Minnesota, as the speaker.

Four special features were reported: change of day of broadcast to Tuesday; special broadcasts on cancer, heart, diabetes and dentistry given in coöperation with special committees; demand for the speaker for personal engagements, 100 of which were accepted during this period; publicity from State Office has been unusually good and mail on program continues heavy with the program still rated as one of the most popular features of WCCO.

Announcement was made of the new policy of the Columbia Broadcasting System with children's programs to be edited by a child psychologist and a group of experts, banning of patent medicine advertising for internal remedies and certain objectionable forms of external remedies, and the limiting of advertising in all programs.

The Reference Committee recommended the proposal of continuing the program for another year; they further recommended that the Radio Committee study and be alert to all radio lectures and other matters that are of questionable nature, and report this to the Council.

Dr. Earl stated that he wished to emphasize the importance of the task that had been delegated to the Radio Committee by the Reference Committee, particularly in regard to the debates on socialized medicine, which are to take place during the coming year in high schools throughout the United States. Dr. W. F. Braasch, Rochester, also spoke on this subject, calling the delegates' attention to the pamphlets issued by the American Medical Association. Secretary Meyerding remarked that material on this subject, for use in debates, would be supplied from the Secretary's office upon request, and he further stated that Dr. Braasch was forming a plan whereby lay speakers, capable of speaking on the subject, would be available to county medical societies.

The Reference Committee further recommended that the Radio Committee inform the Columbia Broadcasting System and Station WCCO that the Association appreciated the recently adopted policy regarding advertising of objectionable forms of internal and external remedies. Dr. B. F. Davis, of Duluth, moved that the Association extend a vote of thanks to the Columbia Broadcasting System and Station WCCO. The motion was regularly seconded and carried.

HISTORICAL COMMITTEE

The Historical Committee, of which Dr. John M. Armstrong is acting chairman due to the illness of Dr. Hamilton, chairman, reported the committee now has in form ready for the printer thirty-three manuscripts covering the history of medicine in Minnesota. In addition the committee has compiled a list of those admitted to the State Association, together with the date and place of their graduation in medicine. The committee believes there is more than sufficient material to form a first volume.

The Reference Committee recommended that the report be referred to the Council with power to act in the matter of publication of the volume, as recommended in the report.

COMMITTEE ON MEDICAL EDUCATION AND HOSPITALS

Dr. C. A. McKinlay, chairman, reported that the Committee on Medical Education and Hospitals has studied the status of post-graduate medical instruction in the state. Information from Dr. Price of the Extension Division indicates that two tendencies with regard to the use of the division and the faculty of the University are apparent: courses given by the medical school and courses before county societies. It was suggested that bulletins on the course include lecturers and subjects and be sent more frequently to the societies.

The Reference Committee recommended the adoption of this report.

COMMITTEE ON PUBLIC POLICY AND LEGISLATION

The report of the Committee on Public Policy and Legislation gave a detailed résumé of a number of bills of interest to the medical profession introduced in the 1935 session of the state legislature.

The report stated that the type of legislation introduced this year differed from that of previous sessions in that many of the bills would have worked a hardship not only on the medical profession but upon the public had they been passed.

The Reference Committee recommended the careful consideration by the delegates of this very important report and recommended that its contents be carefully studied and reported back to the component societies. This report, the Committee pointed out, gives some idea of the type of bills introduced at this session of the legislature, and the disposition of those bills and also expresses the diligence with which the members of this committee have applied themselves to this task.

COMMITTEE ON SCHOOLS FOR LABORATORY TECHNICIANS

Dr. Leo G. Rigler, chairman of the Committee on Schools for Laboratory Technicians, reported that the committee has functioned chiefly as a clearing house for inquiries with regard to schools for laboratory and x-ray technicians. During the coming year a careful investigation will be made of the facilities available in the Northwest for training an x-ray and laboratory technician.

COMMITTEE ON PUBLIC HEALTH NURSING

The Reference Committee recommended the reading of a supplementary report to the report of the Committee on Public Health Nursing by Dr. E. S. Boleyn, chairman. The supplementary report included a suggestion that a committee appointed by the public health nurses should meet with the committee to consider new things which come up, a recommendation that all public health nurses have some medical guidance, and the following principles for any medical program: sound scientific guidance, maintenance of the family-physician relationship, and a fair compensation for services rendered.

Dr. Hultkrans, chairman of the Reference Committee, further stated: "There are several recommendations in this report. I suppose the logical way of disposing of them would be to refer them to the proper committees with power to act. This is an important report, and the Reference Committee did not have any special recommendation to make on it."

COMMITTEE ON INDUSTRIAL RELATIONS

The report of the Committee on Industrial Relations, Dr. J. M. Hayes, chairman, expressed the belief that the Industrial Commission is attempting to coöperate with the medical profession generally. The committee decided that the physician should not be expected to give information to insurance companies regarding patients examined unless he was compensated at least to the amount of $1.00.

The Reference Committee recommended that careful attention be given to the committee's recommendation to make a minimum charge of $1.00 for information given to insurance companies.

COMMITTEE ON UNIVERSITY RELATIONS

The report of the Committee on University Relations, by Dr. F. J. Savage, presented replies to a letter sent out by the committee to the teaching staff of the medical school relative to the efficiency of teaching the present number of students. On good authority, the committee draws the conclusion that from two standpoints, the needs of the state, and proper and adequate teaching, eighty admissions to the freshman class is the desirable number of students.

The committee recommended to the House of Delegates, since the limitation of admissions could be accomplished by action of the Board of Regents, the adoption of the report. It was also recommended that the Secretary be instructed to transmit a copy of this report to the Board of Regents of the University with the request that they appoint a committee to investigate the statements made in this report and if found to be true to take prompt action to curtail the ever increasing output of physicians, thereby maintaining the standards of the medical profession.

COMMITTEE ON MILITARY AFFAIRS

The report of the Committee on Military Affairs was presented by Lieut. Col. F. L. Smith, chairman, who pointed out that the only means of maintaining the Reserve Medical Quota is through reserve members of the State Association contacting young physicians, who are physically qualified, and interesting them sufficiently to apply for a commission. The office of the Corps Area Surgeon will be sorely taxed to supply the authorized increase of CCC camps with Reserve Officers. Among the activities of the Reserves in the state was the Sixth Annual Reserve Officers Inactive Training School, held under the auspices of the Mayo Foundation.

COMMITTEE ON DEAFNESS PREVENTION AND AMELIORATION

Dr. W. L. Burnap, chairman of the Committee on Deafness Prevention and Amelioration, reported that definite progress has been made during the past year in the line of stimulating interest in the expansion of the school health program to include periodic testing of the acuity of school children by modern methods, giving educational addresses on the subject before various groups, adding parochial schools to the list of those active in the movement for better hearing, and providing exhibits on the subject. Dr. Horace Newhart, Minneapolis, presented a supplementary report.

COMMITTEE ON MEDICAL ECONOMICS

Dr. W. F. Braasch, chairman, assisted by Dr. B. J. Branton, presented the report of the Committee on Medical Economics. Dr. Braasch stated that much of the activity of this committee was concentrated in the preparation of material for the columns of the Medical Economics section in MINNESOTA MEDICINE in an effort to arouse the interest of members to the problems. To Dr. Branton was given the special field of the malpractice situation.

Malpractice.—Regarding this subject, since there has been a marked increase in the number of malpractice cases during the last five years, and since only a small percentage of these are justifiable and because insurance premiums have been increased, the committee recommended (1) the establishment of a committee on legal defense consisting of three members to discuss each case brought in this state against a member of this Association, to give advice if requested to such member and to assist in the conduct of his case; (2) that each member of this Association be required to inform this committee of any suit being filed against him within twenty-four hours of service of the paper of suit; (3) that the Board of Censors or Executive Committees in each component society be obligated to obtain full data on each case to submit to the committee; (4) that each member of the Association hold himself in readiness to assist in the defense of a member if called upon by the committee.

A resolution by Dr. Branton that such a committee be appointed was referred to the Council for further study and action.

COMMITTEE TO STUDY STANDARDS FOR FREE MEDICAL SERVICE

Dr. Harry Oerting, chairman, presented the report of the Committee to Study Standards for Free Medical Service. The committee recommended that members of the medical profession continue in the future giving free medical care to those whom they believe worthy of such consideration, since data gathered from the three large cities of the state, smaller cities and rural districts have shown it impossible to formulate a financial standard for free medical care, since conditions are different for each location. The committee also urged that it be kept in mind that there is a definite tendency among some social agencies to regard patients with relative high incomes as eligible to a group who should not pay medical fees.

The following committees made reports, but, in the absence of any new development in their work, they are merely listed:

Committee to Study Contract Practice, by Dr. S. Marx White, chairman.

Editorial Association Committee, Dr. J. A. Watson, chairman.

Heart Committee, Dr. F. J. Hirschboeck, chairman.

Committee on Medico-Legal Affairs, Dr. W. H. Hengstler, chairman.

Committee on Cancer, Dr. Martin Nordland, chairman.

Committee on Interprofesional Relationship, Dr. James Blake, chairman.

Committee on Diabetes, Dr. Russell M. Wilder, chairman.

Committee on Maternal Welfare, Dr. R. D. Mussey, chairman.

SERA Committee, Dr. H. Z. Giffin, chairman.

Dr. Hultkrans, as chairman of the Reference Committee, moved that all acts, appointments and contacts made by the Council, the Secretary and Treasurer for the past year be approved. The motion was seconded and carried.

NECROLOGY COMMITTEE

Secretary Meyerding read the report of the Necrology Committee.

In Memoriam

Members of the Minnesota State Medical Association
July 1, 1934—June 19, 1935

Earle Edson Benedict, Minneapolis. Born 1877. University of Minnesota, 1901. Died August 8, 1934. Aged 57.

Kenneth Simms Caldwell, St. Paul. Born 1892. University of Minnesota, 1918. Died October 2, 1934. Aged 42.

Jared Waldo Daniels, St. Peter, Minn. Born 1867. Rush Medical College, 1889. Died October 9, 1934. Aged 67.

Gustave Julius Dierkes, Winona, Minn. Born 1891. Creighton Medical College, 1917. Died December 9, 1934. Aged 43.

Gerhard Olaus Fortney, Zumbrota, Minn. Born 1882. Rush Medical College, 1906. Died October 26, 1934. Aged 51.

Harry Alfred Halgren, Watertown, Minn. Born 1870. University of Minnesota, 1897. Died September 15, 1934. Aged 64.

Elmer Ellsworth Harrison, West Concord, Minn. Born 1866. University of Minnesota, 1897. Died June, 1934. Aged 68.

Joseph Albertus Hedding, Minneapolis. Born 1883. Minneapolis College of Physicians and Surgeons, 1906. Died December 26, 1934. Aged 51.

Jacob Wilhelm Holderman, Duluth, Minn. Born 1890. Rush Medical College, 1918. Died January 22, 1935. Aged 44.

Alex F. Irwin, Minneapolis. Born 1866. University of Michigan, 1889. Died May 10, 1935. Aged 69.

Herman M. Johnson, Dawson, Minn. Born 1874. University of Minnesota, 1901. Died June 18, 1935. Aged 61.

Arthur Foote Kilbourne, Rochester, Minn. Born 1858. University of City of New York, 1883. Died November 30, 1934. Aged 76.

Arthur Teall Mann, Minneapolis. Born 1866. Harvard, 1896. Died April 15, 1935. Aged 69.

Archibald McEachran, Minneapolis. Born 1866. University of Michigan, 1889. Died April 11, 1935. Aged 68.

Patrick H. O'Connor, Amboy, Minn. Born 1878. Hahnemann Medical College, Kansas City, Mo., 1906. Died December 25, 1934. Aged 56.

Harold Pederson, Minneapolis. Born 1874. University of Minnesota, 1907. Died March 7, 1935. Aged 61.

Addison Milton Rathbun, Rice, Minn. Born 1854. Rush Medical College, 1878. Died December 13, 1934. Aged 80.

Jacob Lincoln Schoch, New Ulm, Minn. Born 1862. University of Michigan, 1885. Died September 22, 1934. Aged 71.

Richard F. Sitar, Minneapoils, Minn. Born 1898. Northwestern University, 1926. Died June 21, 1935. Aged 37.

Ebenezer Knox Smith, Duluth, Minn. Born 1870. McGill University, Faculty of Medicine, 1923. Died October 4, 1934. Aged 64.

Alvin Charles Tanner, Minneapolis. Born 1875. Rush Medical College, 1910. Died February 13, 1935. Aged 59.

Hallward J. Thornby, Moorhead, Minn. Born 1882. Minneapolis College of Physicians and Surgeons, 1909. Died June 17, 1934. Aged 52.

Frederick Eugene Vrooman, St. Francis, Minn. Born 1872. Kentucky School of Medicine, 1902. Died June 25, 1934. Aged 61.

Jacob W. B. Wellcome, Jr., Sleepy Eye, Minn. Born 1867. St. Louis College of Physicians and Surgeons, 1890. Died January 3, 1935. Aged 67.

Douglas Fox Wood, Minneapolis. Born 1874. McGill University, 1900. Died February 9, 1935. Aged 60.

Former Members

Theodore Jefferson Catlin, Buffalo, Minn. Born 1849. Rush Medical College, 1874. Died March 16, 1935. Aged 86.

Joseph Henry Cosgrave, Duluth, Minn. Born 1879. University of Minnesota, 1906. Died February 7, 1935. Aged 55.

Henry Sumner French, St. Paul. Born 1892. University of Minnesota, 1920. Died August 3, 1934. Aged 42.

Florence John Halloran, Jackson, Minn. Born 1859. Rush Medical College, 1888. Died January 23, 1935. Aged 75.

Jacob H. Heimark, Moorhead, Minn. Born 1877. Hamline University, 1903. Died June 25, 1934. Aged 57.

Wilbur N. Morrell, Verndale, Minn. Born 1857. Died Nov. 10, 1934. Aged 77.

Ralph Moore Peters, Minneapolis. Born 1872. Rush Medical College, 1894. Died August 12, 1934. Aged 62.

Ernest Lightfoot Strader, White Bear Lake, Minn. Born 1876. College of Medicine, Louisville, Kentucky, 1902. Died November 6, 1934. Aged 58.

Charles Swenson, Braham, Minn. Born 1876. University of Minnesota, 1903. Died June 22, 1935. Aged 59.

Helen Hughes Hielscher, Mankato. Born 1868. University of Minnesota, 1896. Died May 3, 1935. Aged 67.

Neil Sutherland McDonald, Fort Snelling. Born 1871. University of Michigan, 1895. Died May 3, 1935. Aged 64.

At the conclusion of the report, the members stood with bowed heads for one minute, in tribute to deceased members.

COMMITTEE ON REVISION OF CONSTITUTIONS

In the absence of Dr. Wright, Dr. Braasch, a member of the Committee on Revision of Constitutions for state societies, reported that no action had been taken because of the fact that the American Medical Association has not completed its work on an ideal constitution for county and state medical societies. He stated that it was probable that this may be done in the ensuing year, and, if so, the committee would report at the next meeting, or before if possible. There being no objections, the report was accepted as presented.

Dr. Earl spoke in reference to the resolution to grant a charter to Dakota County Medical Society, stating that before the charter could be granted, every member in Dakota County must be given the opportunity to join. President Coventry stated that it was necessary to have the action of the House of Delegates to grant a charter, but that it would be in order to make a motion with the proviso that all the members of the county be given a chance to join. After discussion, the suggestion was made and adopted that the Secretary communicate with Dr. Sanford and report to the next meeting of the House of Delegates.

COMMITTEE ON AFFILIATE MEMBERSHIP

Dr. L. L. Sogge presented the report of the Committee on Affiliate Membership, offering an amendment to the constitution, as follows: "We move that Article IV, Section 4, of the present constitution be stricken and the following substituted:

> "Section 4. Affiliate Members. Affiliate members shall be those members of component medical societies:
>
> 1. Who through disability are unable to engage in the practice of medicine.
> 2. Who have retired from the practice of medicine.
>
> Provided however, that such member, in either class, shall have first, upon his own request, been declared an affiliate member of such component society at its regular meeting, such action having been approved by the Council, and provided further, that such Affiliate Membership shall automatically cease and revert to its previous status upon the termination of the disability or upon the resumption of practice.

The amendment was accepted by consent, to be acted upon at the next annual meeting, being first submitted to Mr. Brist for his legal opinion.

RESOLUTIONS

Dr. Braasch presented a resolution expressing commendation of the enlightened attitude of the newspapers and the press services generally, in regard to advertising. Dr. Braasch moved the adoption of the resolution. The motion was regularly seconded and carried.

Dr. Braasch read a resolution that the House of Delegates go on record as definitely supporting the House of Delegates and the Board of Trustees of the American Medical Association in its stand against compulsory, contributory health insurance, and commending the American Medical Association for its enterprise in giving assistance and encouragement to experiments controlled by county and state medical societies in new plans for distribution of medical care for low income classes and the indigent, and further, that the

House of Delegates go on record as approving that type of experiment in Minnesota wherever it seems necessary. Dr. Braasch moved that the resolution be adopted. The motion was regularly seconded and carried.

There being no further business, the meeting recessed at ten-thirty o'clock.

HOUSE OF DELEGATES

Second Meeting

Tuesday Afternoon, June 25, 1935

The meeting convened at 12:45 o'clock, President Coventry presiding. The minutes of the meeting of June 23, 1935, were read and approved. Dr. Locken, chairman of the Credentials Committee, reported that fifty members were present. The minutes of the Council Meeting of June 24, 1935, were read and approved.

SECOND MEETING OF THE COUNCIL

The second meeting of the Council in connection with the eighty-second Annual Session of the Minnesota State Medical Association was held at the Leamington Hotel, Minneapolis, Monday, June 24, 1935. Lunch was served at 12 o'clock.

Those present were:

W. A. Coventry
H. M. Workman
J. M. Hayes
H. Z. Giffin
W. W. Will
J. S. Holbrook
G. A. Earl
L. L. Sogge
W. H. Condit
B. S. Adams
F. J. Savage
W. L. Burnap
E. A. Meyerding

Guests:

S. H. Boyer
W. F. Braasch
E. S. Boleyn
Mr. F. M. Brist

The meeting was called to order by the chairman of the Council, Dr. H. M. Workman.

The reading of the minutes was dispensed with. Motion was made by Dr. Hayes, seconded and carried, that the minutes be approved as read before the House of Delegates, Sunday night.

Motion was made by Dr. Will, seconded and carried, that Dr. C. B. Wright be appointed to the Editing and Publishing Committee to fill the vacancy due to the illness of Dr. Hamilton.

The Secretary reported that at 11 o'clock 839 doctors had registered.

The Secretary read a telegram from the American Medical Association about the applicants for membership in the Dakota County Medical Society. Motion was made by Dr. Savage, seconded and carried, that a charter be issued.

The Secretary read a letter from Dr. Hunt of Fairmont concerning bidding for county work. Dr. Sogge asked permission to invite Dr. Hunt to appear before the Council on Tuesday. Granted.

Dr. R. C. Farrish of Sherburn appeared before the Council regarding the bidding for county work in Martin County.

The recommendations of the Committee on Public Health Nursing will be referred to the proper committees.

Motion was made by Dr. Coventry, seconded by Dr. Burnap, and carried, that the appointment of a legal defense committee, as recommended by the Committee on Medical Economics, be deferred until the fall meeting of the Council for further study.

The president appointed Drs. Sogge, Hayes and Burnap to draw up a resolution in memory of Dr. H. M. Johnson, this resolution to be published in MINNESOTA MEDICINE and a copy sent to the family, also that a copy be placed on file in the secretary's office.

Upon the suggestion of Dr. Coventry, Dr. Sogge was appointed to act as administrator for the Educational Fund and Dr. Johnson's estate as far as the Educational Fund is concerned and make a report to the Council.

Dr. Coventry appointed Dr. Sogge as chairman of the Committee on Public Policy and Legislation to fill the unexpired term of Dr. Johnson.

Motion was made by Dr. Coventry, seconded by Dr. Adams, and carried, that Dr. Sogge as chairman of the Legislative Committee call his committee together to formulate a plan for future policy as regards the actions of his committee and report to the Council.

The meeting adjourned.

The Council met with the Minnesota State Board of Health for breakfast at 8 a. m. Tuesday, June 25, concerning the appropriation of Federal funds for a public health program and inasmuch as Dr. Chesley and Dr. R. G. Leland of the American Medical Association will be present at the meeting of the House of Delegates, they will be called upon for the details concerning this program.

Dr. W. A. Condit read the report of the Treasurer, which was approved as read.

REPORT OF TREASURER

MINNESOTA STATE MEDICAL ASSOCIATION

Statement of Cash Receipts and Disbursements for the Year Ended December 31, 1934

CURRENT FUNDS

Cash on Hand, December 31, 1933			$ 8,922.42
Cash Receipts, Year 1934			
Dues collected, year 1933 and prior	$ 306.25		
Dues collected, year 1934	30,164.25		
Dues collected, year 1935	2,625.00		
Total dues collected		$33,095.50	
Interest on savings account		337.35	
Diabetes books		80.08	
Sundry items		7.25	
Transferred from Technical Exhibit Fund for credit of Annual Meeting expense		1,000.00	
*Total receipts			34,520.18
			$43,442.60
Cash Disbursements, Year 1934:			
Special committees:			
Diabetes		$ 501.11	
Educational fund		4,690.35	
Historical		1,107.09	
Hospital and medical education		62.99	
Medical economics		981.38	
Public Health education		2,897,37	
Radio		475.05	
State Emergency Relief Assn.		2,541.83	
State health relations		24.91	
Unbudgeted committee		232.23	
Minnesota Medicine		4,059.96	
Furniture and fixtures		176.96	
Dues refunded		9.00	
Administrative expenses:			
Annual meeting	$ 2,658.55		
Conferences	1,032.01		
Council expenses	392.40		
County officers' meeting	419.15		
Field representative	1,248.81		
Legal expense	1,345.86		
Miscellaneous expenses	373.34		
Office supplies and postage	646.88		
Printed matter	435.61		
Rent	300.00		
Secretary's salary	4,200.00		
Secretary's travel expense	342.99		
Stenographic service	2,242.28		
Telephone and telegraph	464.71		
Treasurer's salary	100.00		
		16,202.59	
Total disbursements			33,962.82
Cash on Hand, December 31, 1934			$ 9,479.78

---

*This amount includes advance collection of dues for 1935.

Dr. Paul M. Gamble, Dr. J. H. Simons and Dr. F. D. Smith were appointed tellers for the election of officers, Dr. Gamble to act as chairman.

The following officers were nominated and elected:

Officers:
  President ....W. W. Will, Bertha
  First Vice President............E. G. McKeown, Pipestone
  Second Vice President..............C. W. Rumpf, Faribault
  Secretary ....E. A. Meyerding, St. Paul
  Treasurer........................W. H. Condit, Minneapolis
Councilors:
  First District..............H. Z. Giffin, Rochester (3 years)
  Second District.............L. L. Sogge, Windom (3 years)
  Ninth District..............B. S. Adams, Hibbing (3 years)
  Seventh District............E. J. Simons, Swanville (for the remainder of the unexpired term of Dr. Will)
Delegates to the American Medical Association:
  Delegate—J. T. Christison, St. Paul.
  Alternate—E. A. Meyerding, St. Paul.

Secretary Meyerding reported that he had communicated with Dr. Sanford in regard to the resolution to grant a charter to Dakota County Medical Society and that Dr. Sanford had stated that every member of Dakota County had been asked to join the new group. Dr. Earl moved that the resolution granting a charter to Dakota County Medical Society be adopted. The motion was regularly seconded and carried.

Secretary Meyerding read the report of the committee to select the scientific exhibit to be awarded the medal given by the Southern Minnesota Medical Association. The committee reported that the exhibit displayed by Dr. A. M. Hanson, Dr. L. G. Rowntree, Dr. J. H. Clark and Dr. Arthur Steinberg, had been awarded the medal. Special commendation was accorded the Mayo Foundation for Medical Education and Research. This exhibit was not open to award. Honorable mention was accorded Dr. R. G. Green, Dr. L. F. Hawkinson, Dr. S. A. Weisman, and the Exhibit of the American Society for the Control of Cancer. The committee commended Dr. Meyerding on the wide variety of the scientific exhibits and the excellent arrangement made for their demonstration.

Dr. L. L. Sogge presented a resolution of appreciation to Secretary Meyerding, and moved its adoption. The motion was seconded and carried.

Dr. R. G. Leland, Director of the Bureau of Medical Economics of the American Medical Association, spoke to the House of Delegates on the Social Security Bill.

Dr. M. C. Piper, Rochester, extended an invitation to the Association to hold its next annual meeting in Rochester. The motion was made, seconded and carried that the 1936 meeting be held in Rochester. By consent, it was left to the Council to determine the time of the meeting.

Dr. A. J. Chesley, Executive Secretary of the Minnesota State Board of Health, addressed the delegates upon the effect of the Social Security Bill.

President Coventry asked Dr. C. L. Scofield to present Dr. Will, President-Elect, to the House of Delegates. Dr. Scofield introduced Dr. Will, who responded briefly, stating that he felt the tremendous responsibility attached to the office of President of the Minnesota State Medical Association, and asking for the coöperation of the members.

Resolutions were adopted expressing the Association's thanks to the Hennepin County Medical Society, the Women's Auxiliary, the Leamington Hotel, Mr. George Adams, Manager of the Minneapolis Auditorium, The Minneapolis Civic and Commerce Association, the Minneapolis papers and radio stations, Dr. J. M. Hayes, Dr. J. K. Anderson and Dr. M. E. Schottler. The president appointed a Committee on Resolutions consisting of Drs. O. E. Locken, O. J. Hagen, E. A. Meyerding and G. A. Earl, chairman.

There being no further business, the meeting adjourned at 2:10 o'clock.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

Books Received for Review

The Treatment of Diabetes Mellitus. Elliott P. Joslin, M.D. (Harvard) M.A. (Yale). Medical Director, George F. Baker Clinic, New England Deaconess Hospital, etc. 620 pages. Price, cloth, $6.50. Philadelphia: Lea & Febiger, 1935.

A Marriage Manual. Hannah M. Stone, M.D., Medical Director of the Birth Control Clinical Research Bureau and of the Marriage Consultation Centers at the Community Church and Labor Temple, New York, and Abraham Stone, M.D., Adjunct Urologist at the Suydenham Hospital, etc. 334 pages. Price, $2.50, flexible binding. New York: Simon & Schuster, 1935.

Laboratory Methods of the United States Army (Fourth Edition). James Stevens Simmons, B.S., M.D., Ph.D., Editor, Major M.C., U.S.A., Director of Laboratories, etc., and Cleon J. Gentzkow, M.D., Ph.D., Associate Editor, Major M.C., U.S.A., Chief of Division of Chemistry, Army Medical School. 1091 pages. Illus. Price, $6.50, flexible binding. Philadelphia: Lea & Febiger, 1935.

Preventive Medicine and Hygiene. (Sixth Edition.) Milton J. Rosenau, M.D., Professor of Preventive Medicine and Hygiene, Harvard Medical School, etc. 1,481 pages. Illus., Price, cloth, $8.00. New York: D. Appleton-Century Co., 1935.

Food and Beverage Analysis. Milton A. Bridges, B.S., M.D., F.A.C.P. Director of Medicine, Department of Correction Hospitals, New York, etc. 246 pages. Price, flexible binding, $3.50. Philadelphia: Lea & Febiger, 1935.

RHEUMATOID CONDITIONS AND CHRONIC ARTHRITIS. Second edition. Ralph Pemberton, M.S., M.D., F.A.C.P., Professor of Medicine in Graduate School of Medicine, University of Pennsylvania. 455 pages. Illus. Price $5.50. Philadelphia: Lea and Febiger, 1135.

To be able to steer a middle course through the vast mass of material which has been written in the last few years on the subject of chronic arthritis is indeed a formidable task. Dr. Pemberton in this new edition of his book has done this splendidly. The book has been rewritten, the more recent experimental and clinical work has been given due consideration; in short, the present volume is an excellent résumé of the subject of chronic arthritis brought up to date. The material has been well digested and is presented in an interesting and easily readable fashion.

The author points out that the exact cause of chronic arthritis is still unknown. He gives the more recent evidence for and against the theory that the streptococcus is the specific etiologic factor. Considerable space is also given to Rosenow's theory of selective localization of bacteria. Dr. Pemberton is not so sure that only the rheumatoid type of arthritis is due to infection. He believes osteo-arthritis may also be infectious. The clinical manifestations of the two main types of arthritis are discussed. The distinctive pathologic findings are adequately considered. The medical management is discussed from the conservative point of view and no hobbies are stressed. This treatise, in the reviewer's opinion, is by far the best book on the subject of chronic arthritis.

M. J. Shapiro, M.D.

SYSTEM OF DIET WRITING.

Wm. S. Collins, B.S., M.D., Chief of Diabetic Clinic, Israel Zion Hospital, Brooklyn, N. Y. 42 pages, diet lists and charts. Price $5.00. New York: Form Publishing Co., 1934.

A small loose-leaf volume covering a multitude of conditions requiring diet writing, and especially comprehensive in regard to the diet of the diabetic and obese. A valuable contribution enabling the general practitioner to quickly and intelligently arrange a diet which the patient can understand.

H. J. Prendergast, M.D.

PHYSICAL DIAGNOSIS.

Seventh edition. Warren P. Elmer, B.S., M.D., and W. D. Rose, M.D. 919 pages. Illus. Price $8.00. St. Louis: C. V. Mosby Company, 1935.

This last edition is more complete than any previous edition. The author has re-arranged and re-written considerable of the subject matter, which makes the volume very worthwhile. It is divided into two parts. The first part embodies the technic of physical examination, and physical examination of the normal body. Under this he has taken up clinical anatomy and physiology of the thorax, circulatory system, and abdomen. Next is considered the preliminary observations such as speech, gait, station, build, and body temperature. Instead of taking up the ordinary routine of inspection, palpation, percussion, and auscultation of each part of the body separately, the author has devised the scheme of covering each diagnostic procedure before taking up another. For instance, inspection of the entire body is discussed before the subject of palpation is introduced. The sensory phenomena and reflexes are discussed and finally the special diagnostic procedures such as thoracentesis, spinal puncture, and vital capacity. Radiology in physical diagnosis is presented by Dr. Sherwood Moore, and an article on electrocardiography by Dr. Drew Luten.

Part Two presents the physical diagnosis of diseases of the respiratory and circulatory systems. Under this are included the diseases of the various organs individually, and their physical findings.

The final chapter on the diagnosis of abnormalities of the heart beat has been written by Doctor Luten.

The volume, as before stated, is extremely complete, the material is excellently presented, and, as the author recommends, should serve as a supplement to clinic and bedside demonstrations.

A. E. Cardle, M.D.

EMOTIONS AND BODILY CHANGES.

H. Flanders Dunbar, M.D., Ph.D., of the Departments of Medicine and Psychiatry, Columbia University. 595 pages. Price $5.00. Published by Columbia University Press, 1935.

This book of 595 pages constitutes a survey of the literature on psychosomatic interrelationships from 1910 to 1933. Necessarily, therefore, it contains at the end an extensive bibliography of 2,251 references. By means of coördinated arrangement of the material taken from these various sources, which includes the opinions of research workers in many countries, and by suitable explanatory remarks, the author presents a well balanced picture of the present-day scientific conception of psychosomatic interrelationships, and the trend of modern research in that field. The only portion of the book in which the author injects his own convictions to any large extent is the final five page conclusion.

The book consists of three parts, the first two comprising 95 per cent of the total, not including the bibliography of course.

Part one orientates the reader in this field of knowledge, and describes the methods of researchers in their study of the problems. It is shown that Hippocrates realized the importance of psychosomatic relationships when he said: "In order to cure the human body it is necessary to have a knowledge of the whole of things"; as well as Paracelsus, who wrote: "True medicine only arises from the creative knowledge of the last and deepest powers of the whole universe; only he who grasps the innermost nature of man can cure him in earnest." Until more recently, modern medicine has been too materialistic and specialistic. Only those things were considered scientifically worthy that could be perceived with the senses and tested with instruments. The body was too much considered as a conglomeration of separate organs and systems.

Part two draws attention to the interrelationships of the various parts of the body, and especially, of course, the relationship of the psyche to the soma or body. It takes up system after system and points out the effects of emotions on their function, as well as the effects on the psyche of any disturbance of function in the somatic organs. The wholeness of the psyche and soma is illustrated early and well by embryologic development, in which it is clearly seen that our organism grows as a unitary whole into the architectural plan determined by our heredity. The question "Physical or psychic?" therefore, is in most cases wrongly put and should be replaced by the question: "To what extent physical and to what extent psychic?"

Part three consists of brief therapeutic considerations and concluding remarks.

The last seventy pages list the above mentioned extensive bibliography.

The book is well worth reading by any physician or surgeon who wishes to avoid the pitfalls of a purely materialistic practice.

Herbert Busher, M.D.

NEW AND NON-OFFICIAL REMEDIES, 1935. Containing Descriptions of the Articles Which Stand Accepted by the Council on Pharmacy and Chemistry of the American Medical Association on January 1, 1935. Cloth. Price, $1.50. Pp. 510. Chicago: American Medical Association, 1935.

In this book the Council on Pharmacy and Chemistry lists and describes the medicinal preparations that it has found acceptable for general use by the medical profession. A glance at the list of the Council members and the long list of consultants appearing in the first part of the book gives ample warrant for the authority of the Council's selections.

Not only does the Council "accept" new preparations but from time to time it omits those which have been accepted but which have not with the lapse of time upheld their original promise of therapeutic merit. The list of omissions for 1934 shows that the Council has been mainly concerned in this respect with B. acidophilus preparations and with antiseptics. Several preparations of each class have been omitted. The list of admissions does not reveal the presence of any preparation that promises to be epoch making in the sense that insulin was, for instance. However, the following newly accepted preparations are noteworthy: Carbarsone, an arsenical used chiefly in the treatment of amebiasis (the Council published a special report on this drug, supplementing the preliminary report of 1932); Hippuran and Diodrast, two different types of urographic contrast mediums: Cartene, the precursor of vitamin A; Dilaudid, a substitute for morphine; Neo-Synephrin Hydrochloride, which has a number of advantages as a vasoconstrictor over synephrin tartrate; and Diothane, which represents a type of local anesthetic entirely different chemically from any heretofore accepted for N. N. R.

The description of products containing vitamins A and/or D have been revised to give the potencies in terms of the recently adopted pharmacopeial units, thus bringing some measure of uniformity into this heretofore chaotic field. No doubt the book will be revised next year to conform with the new Pharmacopeia in its entirety.

A valuable feature of the book is the grouping of preparations in classes. Each of these is introduced by a general discussion of the group. Thus the silver preparations, the iodine preparations, the arsenic preparations, the animal organ preparations and the biologic products are each preceded by a general discussion of the particular group. These general articles compare the value of the products included in the group with similar pharmacopeial and other established drugs which it is proposed that these proprietary preparations shall supplement or supplant.

Physicians who wish to know why a given proprietary is not described in New and Non-official Remedies will find the "Bibliographical Index to Proprietary and Unofficial Articles not Included in N. N. R." of much value. In this section (in the back of the book) are given references to published articles dealing with preparations that have not been accepted. These include references to the Reports of the Council, to Reports of the A. M. A. Chemical Laboratory and to articles that have appeared in *The Journal.*

ACETYL-BETA-METHYLCHOLINE AND MECHOLYL (MECHOLIN)—MERCK

Under the name Mecholin, the firm of Merck & Co., Inc., recently submitted to the Council on Pharmacy and Chemistry its brand of acetyl-beta-methylcholine. Subsequently the firm informed the Council that, on account of possible trade mark interference it was obliged to change the name to "Mecholyl." The question of the firm's right to the use of a proprietary name has not yet received definitive consideration by the Council. The actions of acetyl-beta-methylcholine resemble the "parasympathetic" actions of acetylcholine and appear to produce little or no "nicotine" effect. Unlike acetylcholine, it is capable of exerting a physiologic effect when administered orally. When injected subcutaneously its actions appear to be more prolonged than those of acetylcholine. The intravenous injection is likely to prove dangerous. In selected cases of paroxysmal tachycardia not responding to the usual therpeutic measures, the careful administration of graded doses of acetyl-beta-methylcholine is probably of value. Overdosage of the drug and administration to patients with asthma should be avoided. For preventing attacks the drug is inferior to quinidine. In other forms of tachycardia and in auricular fibrillation, the usefulness of the drug is not apparent. The clinical data presented are not sufficiently complete to justify an evaluation of the results obtainable in Raynaud's disease. In hypertension the value of the drug appears to be limited to the temporary relief of headache. The therapeutic value of the drug in intestinal paresis following laparotomy should be more definitely established. The Council points out that, since the clinical status of the drug is still experimental, a preliminary informative article should be published; that the report is not derogatory to the product, but the available evidence is not sufficient to justify the acceptance of acetyl-beta-methylcholine (mecholyl Mecholin) for general use by the profession at this time. The Council will again consider the product and related questions when further evidence is available. (J. A. M. A., July 27, 1935, p. 281.)

TOMAC OXYGEN INSUFFLATOR

A portable tracheal apparatus for the administration of oxygen. The outfit is small and compact, which provides for easy removal to the bedside of a patient or wherever needed. This Insufflator was used in a clinic for a period of eighteen months and found to be efficient and durable. American Hospital Supply Corporation, Chicago. (J. A. M. A., July 20, 1935, p. 200.)

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society.

Volume 18 November, 1935 Number 11

THE PREVENTION OF WHOOPING COUGH WITH BACILLUS PERTUSSIS VACCINE*

LOUIS SAUER, M.D.

Associate in Pediatrics, Northwestern University Medical School

Chicago, Illinois

WHOOPING cough: A specific, endemic infection of the respiratory tract, most prevalent in young children, is characterized by persistent paroxysms of coughing which, in the course of weeks, usually end in an inspiratory whoop and vomiting; the resulting immunity is usually permanent.

The pertussis bacillus, isolated, cultivated and accurately described, in 1906, by Bordet and Gengou[1] of the Brussels Pasteur Institute, fulfills as the etiologic factor the postulates of Koch. These investigators found this minute bacillus, at times, in nearly a pure state, in the glistening pearls of mucus, coughed up early in the disease. This Gram-negative, capsulated, hemoglobinophile is notoriously difficult to isolate. It grows well on the culture medium perfected by Bordet.† A well-developed colony approximates one millimeter in diameter. When viewed in reflected light, a definitely darkened zone is usually seen to surround each minute, round, markedly raised, pearly gray colony. In transmitted light this darkened area, and the colony, appear distinctly lighter than the surrounding medium. The soft colony can be quite completely wiped up with one sweep of the platinum loop. In subculture, the growth is usually rather luxuriant within forty-eight hours. The organisms diffuse evenly when mixed with a droplet of water on a clean slide. Microscopic smears stain feebly. When first isolated, some of these ovoid bacilli show bipolar staining. In frequent transfers they usually appear more coccoid. Unlike B. influenzæ, pleomorphism is rare in recently isolated cultures.

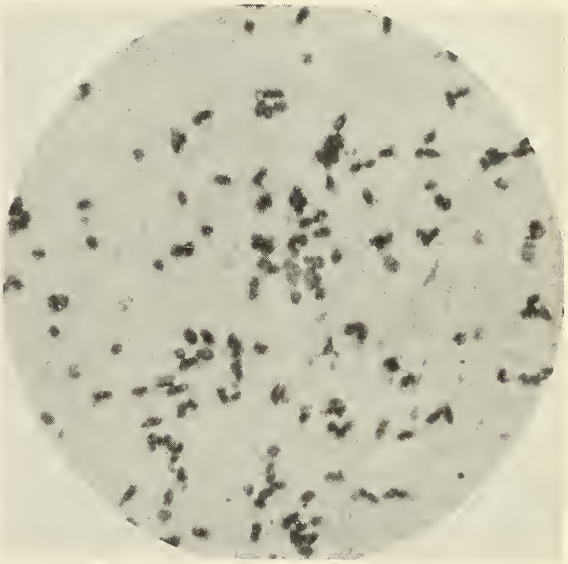


Fig. 1. Bacillus pertussis × 1740.

Inaba,[4] in 1912, reported the first authentic case of experimental whooping cough. Two weeks after a freshly isolated, forty-eight-hour growth of B. pertussis was swabbed on the pharynx, the ten months' old macacus monkey began to cough in paroxysms. On the seventeenth day, severe paroxysms of coughing ended with the expectoration of mucus and vomiting. A Gram-negative bacillus was recovered. The complement fixation test was positive, when the cough subsided. After many futile attempts,[7] Sauer and Hambrecht[8] produced paroxysmal coughs from one to three weeks after recently isolated B. pertussis cultures were injected into the larynx of five healthy young monkeys. Similar coughs followed inoculation into the nares of three healthy young monkeys. The white cell and differential blood counts usually showed the transient lymphocytosis characteristic of pertussis in man. The pertussis bacillus was recovered from deep throat cultures; also from the larynx, trachea and lungs, after death. During the height of the cough, the bacillus was recovered from an animal that had been inoculated with the bacillus recovered from the lung of another coughing animal. Animals that recovered were immune to subsequent overwhelming injections of various strains of B. pertussis. The bronchi were found to be the primary seat of the infection in uncomplicated (benign), experimental pertussis.[9] Endobronchitis and peribronchitis were more pronounced than endobronchiolitis and peribronchiolitis. The latter were more pronounced in human and in experimental pertussis bronchopneumonia. Alveolar involvement seemed to occur by way of the bronchioles. Only pertussis bacilli were found on and between the cilia of the finer bronchi in benign experimental pertussis. In human and in experimental pertussis bronchopneumonia, pertussis bacilli were found also in the alveoli. Mucopurulent inflammation was replaced relatively early by round cell infiltration; the latter was most pronounced where the injury was most profound. Typical intracellular inclusion bodies could not be found.*

---

*Read at the 82nd Annual Meeting of the Minnesota State Medical Association and before the Medical Section, American Association for the Advancement of Science; Minneapolis, June 25, 1935. Presentation sponsored by the Northwestern Pediatric Society.

†Boil until soft 500 grams of peeled, sliced potatoes in 1,000 c.c. distilled water and 40 c.c. glycerin. Adjust to original weight and strain through gauze. To 500 c.c. of the filtrate add 1,500 c.c. of 0.6 per cent salt solution and 60 grams of agar. After autoclaving, cool to 45° C.; add 120 c.c. of the supernatant to 30 c.c. of sterile, fresh defibrinated blood (human, sheep or horse) warmed to 45° C. Pour into sterilized Petri dishes, culture boxes or tubes; refrigerate until used.

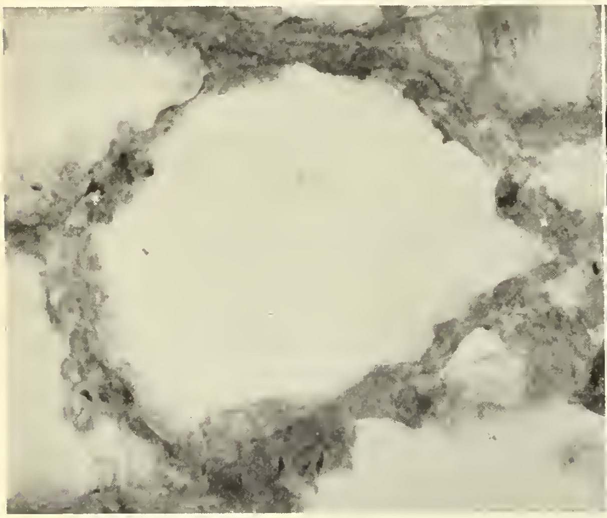


Fig. 2. Alveolus in benign experimental pertussis. Alveolar walls show no intracellular inclusion bodies. × 1500.

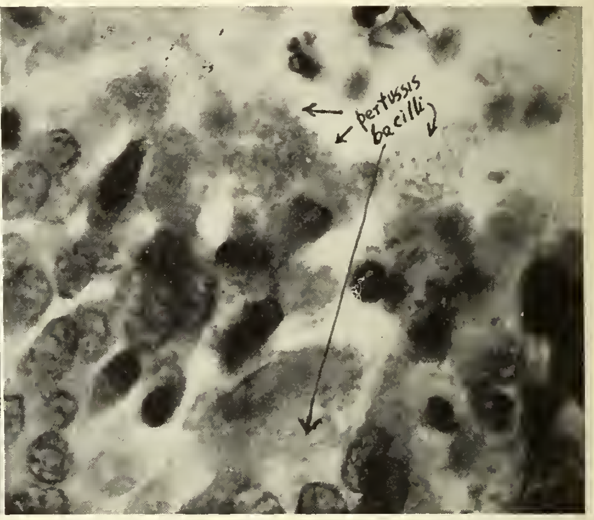


Fig. 3. Human pertussis bronchopneumonia. Alveolus contains: B. pertussis, lymphocytes, leukocytes and desquamated epithelial cells; no intracellular inclusion bodies were found. × 1500.

The diagnosis of whooping cough is relatively simple when the cough is already typical, or when it is known that a coughing non-immune was intimately exposed to infection. If the paroxysmal cough has persisted for more than a week, white cell and differential blood counts often aid in diagnosis. Leukocytosis over 15,000, with an increase in the percentage of lymphocytes, is characteristic of pertussis; but the absence of such changes in the blood picture does not exclude whooping cough. The cough plate of Chievitz and Meyer,[2] of the Danish State Serum Institute, when positive, is a valuable laboratory aid in early diagnosis. Negative plates, however, do not exclude the disease. If a Petri dish or culture box of fresh Bordet medium is held, vertically, in front of the open mouth at the moment of several deep, expulsive coughs, and promptly incubated at 37° C., the minute colonies of B. pertussis can often be distinguished with a hand lens at the end of three or four days. Only properly exposed plates should be incubated. Satisfactory exposure, sufficiently early in the disease, is the most important technical step. At the daily examination of the incubated plate, rapidly growing saprophytes should be removed with the hot wire. In a total of 4,432 cases of pertussis, cough plates were exposed by seven groups of workers, with the following percentage of positive plates: first week, 77; second week, 61; third week, 56; fourth week, 30; fifth week, 14; sixth week, 3.

---

*Recent experimental work on monkeys by: Shibley, G. S. (Proc. Soc. Exper. Biol. & Med. 31:576, 1934); Rich, A. R., P. H. Long, J. H. Brown, E. H. Bliss, and L. E. Holt (Science 76:330, 1932); Culotta, C. S., D. F. Harvey and E. Gordon (J. Ped. 6:743, 1935); seems to rule out filtrable virus and substantiates the etiological role of B. pertussis.

Specific serologic tests, such as agglutination and complement fixation, usually become positive some weeks after the onset of symptoms, reach a peak, then decrease or completely disappear within a few months or years. Their course is quite similar after the injection of non-immunes with potent antigen. Huenekens[3] was the first to show that fresh B. pertussis vaccine produces a positive complement fixation test. Such tests, however, are no index of immunity. They are transient, whereas immunity is more prolonged—usually lasts for the remainder of the individual's life. Indeed, when such tests are at their height, active immunization is not yet complete. A time interval of several months must elapse before the injection of 8 c.c. of this B. pertussis vaccine will produce active immunity in a majority of exposed young non-immunes.

Nearly a score of investigators have reported specific immunity tests (*i.e.,* a skin-test like the Schick test), whereby non-immunes can be differentiated from immunes, but confirmatory evidence is still lacking. The whooping cough bacillus is an endotoxin-producing pathogen which imparts relatively little soluble toxin to the culture medium in which it grows.

Although exposure to infection is not synonymous with infection, it serves as the ultimate test of the efficacy of an immunizing agent. The evidence of active immunization with B. pertussis vaccine is based on what happens to injected nonimmunes when subsequently exposed to whooping cough. Because exposures in the family are usually more intimate, repeated and prolonged, than are casual exposures outside (as in the classroom or at play), exposures are grouped into: "familial" and "outside." One cubic centimeter of the vaccine is injected, hypodermically, in the deltoid region of each arm; a week later, 1.5 c.c. are injected into the biceps region of each arm; a week thereafter, 1.5 c.c. are injected into the triceps region of each arm. Syringe and needles are sterilized by heat (oven at 250° F. for one hour). After briskly shaking the vial, the rubber cap and site of injection are sterilized with sterile cotton saturated with ethyl alcohol. Parents should be forewarned of the transient local tenderness, redness and occasional rise in temperature; also, of a local nodule or induration which may persist for several weeks. Injections should not be given in the area of a previous toxoid injection or smallpox vaccination. Parents should not take the child's temperature, nor should anything be applied locally. Over 10,000 individual injections of this vaccine have been given, in Evanston, without producing an abscess or scar. Should a marked reaction occur, the subsequent doses should not be increased, but an extra bilateral injection should be given a week after the last injection, so that the total dosage equals 8 c.c. (1 c.c. in each arm for four successive weeks).

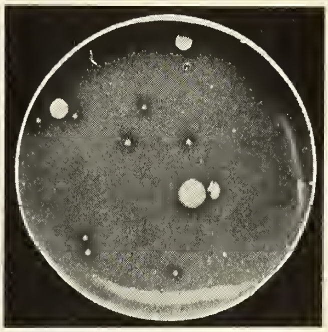


Fig. 4. Positive cough plate showing zoned colonies.

Between 1928-32, a total of 394 selected young non-immunes (average age about fourteen months) were injected with the vaccine made at the Evanston Hospital.[7] To date, a total of 30 of these injected children in twenty-four families were intimately exposed to whooping cough in their twenty-eight non-injected (control) brothers and sisters. All of the controls in these families contracted the disease; *i.e.,* the communicability rate was 100 per cent. All of the injected children escaped. A total of 167 of the injected children were casually exposed over 200 times, outside the household, but none contracted the disease.

Northwestern University Medical School has granted to two biological laboratories the privilege to make the vaccine according to our detailed specifications. Each month they are supplied with recently isolated, hemolytic strains. Human blood is used in the culture medium. Since 1932, over 1,000 young non-immunes (average age about eleven months) were injected with the approved commercial vaccine. This group is comprised of about 450 private patients, 500 city welfare infants, and 160 in a Chicago orphanage. There have occurred, to date, thirty-eight familial exposures, with three failures; also, thirty-one casual (outside) exposures, with three failures.

Since 1932, twenty-nine physicians in eighteen states have reported the injection of 2,348 young non-immunes. The average age of this group is appreciably older. A total of seventy-six subsequent exposures are known to have occurred. To date, thirteen of the injected children have contracted the disease. It is not unlikely that the number of exposures was appreciably higher than seventy-six. The percentage of failure, computed from the number of known exposures, is 17.1 per cent. From a total of approximately 3,800, a total of 342 are known to have been exposed with a total of nineteen failures; *i.e.*, a protection of over 90 per cent. Most of the injected children who contracted the disease had it in a mild form.

The most conclusive evidence that the Evanston vaccine produces active immunization was reported by Macdonald and Macdonald,[5] in 1933. They injected two of their four non-immune sons with the Evanston vaccine. Five months thereafter, when the four boys had been in quarantine for several weeks (to exclude outside infection), a very weak suspension of living pertussis bacilli was inoculated, intranasally, into each of the four boys. The non-injected boys contracted typical pertussis (positive cough plates, lymphocytosis, paroxysmal cough, whoop and vomiting for weeks). The injected boys escaped; neither developed a cough from the inoculation of living pertussis bacilli, nor from the intimate exposure to their coughing brothers. At the conclusion of the experiment the complement fixation was equally positive (four plus) in the four boys. This test brings strong evidence that whooping cough is due to the Bordet-Gengou bacillus; also, that the Evanston vaccine produces active immunity.

Because failure of the vaccine to confer active immunity may be due to a number of causes, it seems advisable to discuss this in greater detail.

1. Mishulow, Oldenbusch and Scholl[6] found room-temperature to decrease the antigen in B. pertussis vaccine. Since warmth accelerates chemical changes, deterioration is retarded by keeping the vaccine cold (at 8 to 12° C.) until it is used.

2. One of our failures was in a girl of five years. The other three children of the family, immunized at the same time, escaped, although very intimately exposed to her throughout her illness. It is not unlikely that children over three or four years of age may require somewhat more than 8 c.c., possibly 10 or 12 c.c., of the approved commercial vaccine. Several physicians, who kindly reported failures, offered this suggestion.

3. Three of our failures occurred in children who were injected soon after recovery from measles. Until more is known about the effect of such disease on the immunity response from pertussis vaccine, it seems advisable to wait a month (or more) after recovery, before giving the vaccine. The occurrence of other diseases soon after giving the vaccine might likewise inhibit or deter the immunizing effect of the vaccine.

4. It has been quite definitely established that a time interval of several months is required for active immunity to be completed. If exposure to infection occurs within that time, failure might occur. Several parents have wilfully, but without our knowledge, intimately exposed their five injected children to early cases of whooping cough, more than a year after the injections, without producing the disease.

5. The potency of the individual strains and the strength of the vaccine (1 c.c. should approximate 10,000 million bacilli) play important rôles in the immunity response.

Because whooping cough is more likely to be serious during the first three years of life, it seems rational to give the pertussis vaccine first, *i.e.*, before the other customary immunizations. Until it has been determined how early in life active immunization can be effected, the best age seems to be between the sixth and twelfth months—preferably during the eighth month. The following plan has been found practical: to vaccinate against pertussis at eight months; against diphtheria at a year; against smallpox at eighteen months (when the subsequent Schick test readings are made); and against scarlet fever before nursery-school or kindergarten attendance. Because several months are necessary for the immunity response to be completed, other immunizations have not been given within four months after the pertussis vaccine injections; nor has the vaccine been given until several months after other immunizations. Results will depend upon: the concentration and quality of the vaccine; the vigilance of physician, jobber and druggist in regard to the storage and age of the vaccine; the age and health of the child when the vaccine is given; and the time interval between injection and exposure.

Conclusion

This bacillus pertussis vaccine should prevent whooping cough in a high percentage of young non-immunes, if the outlined details are observed.

References

1. Bordet, J., and Gengou, O.: Le microbe de la coqueluche. Ann. de l'Inst. Pasteur, 20:731, 1906.
2. Chievitz, L., and Mayer, A. H.: Further investigations on whooping cough. Ann. de l'Inst. Pasteur, 30:503, 1916.
3. Huenekens, E.: The prophylactic use of pertussis vaccine controlled by the complement fixation test. Am. Jour. Dis. Child., 14:283, 1917.
4. Inaba, I.: Ueber den Bordet-Gengouschen Keuchhustenbacillus bes. Uebertragungsversuche des Keuchhustens auf Treve. Ztschr. f. Kinderh. 4:252, 1912.
5. Macdonald, H., and Macdonald, E.: Experimental pertussis. Jour. Infect. Dis., 53:328, 1933.
6. Mishulow, L., Oldenbusch, C., and Scholl, M.: Potency of stored pertussis vaccine. Jour. Infect. Dis., 41:169, 1927.
7. Sauer, L.: Immunization with Bacillus pertussis vaccine. Jour. Am. Med. Assn., 100:239, 1933; 101:1449, 1933.
8. Sauer, L., and Hambrecht, L.: Experimental site of lesion. Arch. Path., 8:944, 1929.
9. Sauer, L., and Hambrecht, L.: Whooping cough; site of lesion. Arch. Path., 8:944, 1929.

THE INCEPTION AND DEVELOPMENT OF FLUOROSCOPY: THE INFLUENCE OF CARMAN ON ITS STATUS IN AMERICA*

PERCY BROWN, M.D., F.A.C.P., F.A.C.R.

Boston, Massachusetts

MERELY to have been considered without disfavor in connection with the second Russell Carman memorial lecture is compliment indeed; to have been chosen to deliver it is distinction of the first order. But as I stand before you thus distinguished, I feel impelled to declare that the essential source of my appreciation lies even deeper—most profoundly do I esteem also the privilege of taking part in this hour so appropriately commemorative of the forthright life and good works of a former colleague and an old friend. His consistent progress along the clearly-cut path of his professional life from the moment of our first meeting I observed with pride—pride in the possession of his friendship, and pride on behalf of my specialty of radiology in *its* possession, in him, of a champion of its most exalted purposes and ideals. In view of the years of his distinguished identity with the activities of his life-work, culminating with his world-recognized eminence in it, strange and fantastic seems the thought of his once serious interest in any other denomination of medical endeavor, yet in this connection the circumstances of our first meeting will ever be before me in memory, and they may be of a moment's passing interest.

I first saw Russell Carman seated on a low bench in a darkish corner of the basement orthopedic plaster-room of one of Boston's smaller hospitals. His legs were extended and his chin was sunk upon his chest. But his posture implied neither dejection nor profound meditation—far from it. He was merely carving the lines of a proper longitudinal arch on the plaster cast of a flat-foot. At me, to him a stranger, he looked up with that smile that no visitor to Rochester in later years will ever forget, tapping the cast with his knife-handle to remove the shavings; and with his spoken pleasantry to the effect that a second Praxiteles had arrived to grace the world of sculpture, our friendship was born—vivified, no doubt, by being swathed in the warming folds of his spontaneous humor. *Apropos* of Carman's occupation at that moment, Doctor Balfour told you last year of his original intention to enter upon the practice of orthopedics. He would have adorned that branch of surgery even as he graced the field that ultimately he chose, but, in the light of historical record, what a loss to the development of radiology had Carman adhered to his first intention! The Fates, however, in a moment of kindly disposition placed him, rather, in a field of Medicine the soil of which had been not long turned over by the ploughshare of discovery, and which was awaiting the energies of those who would seminate it and would cultivate it in a manner best suited to the welfare of Humanity. Russell Carman, by fortune's favor and his own integrity of purpose, became one of these, and that which he accomplished is inscribed on many a fair page of the history of scientific progress, which need no re-reading to this audience.

---

*The Russell Carman Memorial Lecture for 1935, presented at the annual meeting of the Minnesota State Medical Association, Minneapolis, June 25, 1935.

Carman was ever a protagonist for fluoroscopy in roentgen diagnosis both by word and deed. Throughout the major portion of his medical life, his published observations were based in generous measure on his findings by fluoroscopic screen, notably with reference to alimentary anomaly and disease. As he preached so did he practise. A fluoroscopic demonstration by him was one of the Rochesterian lodestones that have for so long projected their magnetic attraction into all corners of a medical world that delights to learn by observation. To sit by his side, facing the pale glow of his fluoroscopic screen, was to witness the exhibition of a skill that could result only from his deep love of the work as well as from his implicit faith in it. In Carman's hands, the practice of fluoroscopy involved the exercise of a sympathetic individualism that would be quite lost amid the multi-personal technicalities of mere radiography. What better proof of this than his memorable habit of preliminary kindly inquiry as to the habitation, home-life and little predilections of an agitated patient who had entered for the first time the Cimmerian atmosphere of the screening-room, but who, from that moment, was disturbed no longer and whose upper digestive tract forthwith shared his tranquillity? It is an *art* thus to mitigate, with the warmth of sympathy, the cold impersonality of an applied science—and in the doubtful gloom of that chamber, in front of an invalid soothed and calmed without having even seen clearly his benignant face, sat an artist of the first magnitude!

Perhaps, then, it were not inappropriate, as the second lecture to be given in respectful commemoration of the life of this remarkable man, briefly to consider the history of the diagnostic adjuvant by which he laid such great store, which he was ever ready stoutly to defend, the elaboration and expansion of which his loyal support so greatly aided, and through which he served humanity so devotedly and so effectively.

* * *

It is to the gifted Irish Cantabrigian, Sir George Gabriel Stokes, of course, that we are indebted for the term *fluorescence* as well as for the greater part of our present knowledge of this subject, but we should not allow to escape from our memory the name of the discoverer of this beautiful phenomenon as well as of the principle of lenticular stereoscopy and of the kaleidoscope, the versatile Sir David Brewster, Scottish theologian, natural philosopher, biographer and editor. Well-known are his observations on the behavior of a beam of solar light on passing, after condensation, through a solution of chlorophyll. The sub-fluid course of this beam was revealed to him as a ray of brilliant crimson. Investigating further, he observed varied color-change, produced in the same manner, in connection with other vegetable solutions, with certain essential oils and also with some crystals, among them native calcic fluoride, or fluor-spar. The results of this initial experimentation were communicated by him to the Royal Society of Edinburgh in 1833. Calling the phenomenon *internal dispersion,* Brewster believed it due to the scattering of light by colored particles held in suspension. Somewhat later, Sir John Herschel observed that a beam of solar light, striking a solution of quinin sulphate, became "epipolized," as he called it; it assumed a blue color in a stratum just beneath the surface of the fluid at which the beam entered. Beneath this stratum the beam was not changed as to color or strength, nor could it be recolored by passing it through a second solution of quinin sulphate.

As much later as 1852, it remained for Stokes, using at first a solution of quinin sulphate, to show that the effect was due, not to the scattering of light by suspended particles, but to the fact that the dispersed beam actually differed in refrangibility from the light which excited it. On this basis, he called the phenomenon for a time *true internal dispersion,* as opposed to the theory of light scattering, which he considered under the name of *false internal dispersion.* Ultimately dissatisfied with this definition, he adopted the term *fluorescence.* The outcome of Stokes's prolonged experimentation is now common knowledge of the physical laboratory; it resulted in the law that the fluorescent light is of lower refrangibility, of greater wave-length, than the light exciting it, or, as the electrophysicist Hammer[10] many years later aptly observed: "In electrical parlance, a fluorescent substance might be termed a step-down transformer for light-waves." Stokes' Law did not apply to all substances, as he believed, for it was later shown that there are more than one kind of fluorescence. Of the scores of substances from the mineral and vegetable kingdoms that had contributed to the researches of Brewster, Herschel, Stokes, Pierre, Lommel, Voight and others, the humble group of the platino-cyanids alone were touched by the bright wand of Destiny, and down through the long years of laboratory experimentation and lecture-room demonstration the platino-cyanid of barium found its solitary way to that memorable table in one of the smaller rooms of the Physical Institute of the University of Würzburg. Heretofore, the phenomenon of fluorescence was an instrument of pure science, largely utilized to illustrate the laws of reflection and refraction. The instant a bit of paper coated with this salt was seen to glow in complete darkness, for no apparent reason at the moment, by the quick eye of Professor Röntgen, rays of a wave-length otherwise invisible to the eye were revealed, and at the later moment when Röntgen first interposed an object between this fluorescent paper and the Hittorf-Crookes tube, encased in black paper, with which he was just then working, fluoroscopy as a practically living thing was born.

Röntgen, according to the story that has been retold so vividly of late,[9] had been engaged in repeating Lenard's experiments with cathode rays, and had covered a Lenard tube with black paper to observe their fluorescence through a window in the tube. He then continued his work with a Hittorf-Crookes discharge tube. The barium platino-cyanid paper was at hand because, as he later told Mackenzie-Davidson, this salt was in common use among German physicists to reveal the invisible portions of the spectrum. Röntgen's use of it in his succeeding observations, once its behavior in the presence of the covered tube was noted, was mentioned by him in his classic *Preliminary Communication.* This resulted in its almost universal adoption as the medium of choice in the earliest days of fluoroscopic investigation. In its employment the method of Röntgen was generally followed, except that there was a widespread effort to obviate the darkened chamber enclosing the observer. Curiously enough, in their enthusiasm over their specialized devices to simplify the scrutiny of the fluorescent screen by merely shading the eyes, many physicists almost created a popular conviction that they had produced something involving an entirely new application of the principle of x-radiation. This sentiment was perhaps strengthened by the fact that each was quick to give his device a specific name. Thus, as the painstaking historian Glasser observes, the "cryptoscope" of the Italian physicist Salvioni,[13] of Perugia, "caused almost as much enthusiasm . . . as was caused by the announcement of the discovery of the roentgen rays." Yet it would be unjust to the spirit of Salvioni to assume that he sought for himself one jot or whit of such credit, unthinkingly misplaced. His instrument, the first of its kind, was tubular in form. One end was closed by a sheet of black paper upon which, for temporary lack of barium platino-cyanid, was spread a layer of fish-glue and calcium sulphid. Within the tube, near the opposite end, was fixed a lens giving a clear image of the luminescent paper, which must have been so largely phosphorescent. Concerning this device, Salvioni was modesty itself. "In this," he says in his description, "there is, of course, nothing new which could not have been deduced from the original experiments of Röntgen; the novelty, if indeed, it is so, consists merely in making use of the known facts to design the arrangement. It seems to me that, in a more perfected form, it might be of extensive use in surgical and medical science. The sulphide of calcium may be replaced with advantage by the cyanide of barium and platinum . . . "

Salvioni's term "cryptoscope" was not infrequently applied to any form of hooded screen for some years following 1896. One well remembers its occasional usage in our country even after the period of Edison's exhaustive investigations of that year. William Rollins very frequently made use of the term. Close on the heels of Salvioni's work came reports of other forms of hooded fluoroscopic screens. The instruments of Spies and E. P. Thompson were truncated cones instead of being cylindrical. Thompson, not to be outdone in the way of especial designation, called his device a "kinetoskotoscope." The apparatus of Magie, of Princeton University, was closely contemporaneous with that of Salvioni; likewise it was tubular in form. It was known as a "sciascope." The devices of John MacIntyre and of Edison were truncated pyramids; it was this form that prevailed in the later construction of the hooded fluoroscopic screen, through the romantic and tragical days of its rise, decline and fall.

Throughout what may be called the pre-Edisonian era, all designs of fluoroscopic apparatus involved the use of the platino-cyanid of barium. Salvioni mentions its desirability and undoubtedly would have employed it in his first device had circumstances permitted. An early exception was the screen of Herbert Jackson, of Kings College, London, upon which potassium platino-cyanid was the salt employed.

From Mr. Edison's well-known experiments of 1896 with a tremendous number of crystalline substances came the discovery of a fluorescent salt which in many ways, although not in all, was superior to the cyanid; it was not so susceptible to atmospheric conditions but it was sufficiently phosphorescent to give it an appreciable "lag," but for fluoroscopic purposes this was not a great fault. With this substance, calcic tungstate, in a finely divided form, he coated a plane support and covered this screen with a hood in the shape of a truncated pyramid to exclude daylight, placing an aperture formed for the eyes at the line of truncation and a supporting handle on one of the sides of the pyramid. Edison called his device a "fluoroscope," but in declaring that he invented the fluoroscope many historical writers have created the false impression that he was the discoverer of the initial practical means by which invisible x-rays are changed to visible light rays. This discovery, of course, was Röntgen's, but to Edison is to be given the credit of the discovery of the tungstate of calcium as a fluorescent material of peculiar qualities of excellence.

The use of the hooded screen had as its earliest purpose the lecture-room or laboratory identification of the presence of roentgen rays in the general study of radiation; later, it was frequently used in demonstrations that were held under conditions of a character less academic, many of which were patterned, on a smaller scale, after Edison's historic fluoroscopic exhibition of 1896, given in conjunction with the exposition of the National Electric Light Association at the Grand Central Palace, New York. Also, the hooded screen was used as a medium of gauge to test the quality of x-emanation during the course of evacuation of Crookes tubes or of radiographic exposures—a pernicious practice to which is appended one of the sad phases of radiologic history. Finally, as the petals of the flower of evolution slowly opened, the *fluorescent* screen of the physicist became the *fluoroscopic* screen of the clinician, in form both open and hooded, and the path was cleared for its steady advance in diagnostic usefulness.

There can be no question that the earliest medical attitude toward fluoroscopy, or roentgenoscopy, was in great measure influenced by the contemporaneous opinion of the physical or engineering laboratory. In view of the practical outcome of his intensive labor in the matter of fluorescent substances, Mr. Edison was enthusiastic, even arbitrarily so, over the future of his "fluoroscope." Said he, as reported[8] in the *American Journal of Photography* of April, 1896, ". . . There is no occasion to take photographs, shadowgraphs or radiographs. I stopped that long ago. You can see for yourself, the fluoroscope does the work in a moment." One can not but wonder at the effect on the development of radiology had he indeed "stopped" roentgenography! No doubt he had in mind, in this connection, the problems of minor traumatic surgery which, at an earlier day, usually presented themselves to non-medical thought where the roentgen rays were concerned, but Edison's every pronouncement attracted wide attention and one is constrained to feel that his attitude had much to do with the intensity of the "first fluoroscopic era," as it may be called, that obtained from 1896 to 1900. There is but little doubt, also, that the demand upon the early roentgen worker of this period for the "quick" use of the fluoroscope (which, mind you, was still largely the hooded screen) in emergency surgery or in the more gross pathology of the thorax, was at least one of the factors, albeit a lesser one, making for the wide incidence of radiation-dermatitis during those years. "All we need here is the fluoroscope—that will tell us all we want," are words that still ring in the ear of the medical pioneer in radiology, and, since the use of this instrument alone was thus preordained, the ensuing scrutiny was usually prolonged. In this way the seed of irreparable damage was frequently sown. The martyred pioneer Kassabian, in somewhat rueful retrospection of the conditions of the first fluoroscopic era that led to his plight, remarked of the ardent souls who thus importuned him: "I would have stopped the [use of the] fluoroscope then, but they would not let me." However, the bearing of the fluoroscope on the history of the martyrs to roentgenology is a matter of another writing, and by no means germane to our consideration of today.

Francis Williams of Boston, constantly aided by his *fidus Achates,* William Rollins, labored diligently throughout these four intensive "fluoroscopic" years. Being an internist by medical training and for many years an attending physician to his hospital, he paid little attention, when once launched upon his new-found work with x-rays, to the clamor for the impromptu use of the fluoroscope in minor surgical problems. Williams and Rollins, by nature, were to hasty and incomplete procedure as oil, by nature, is to water. This was the existing equation, at the Boston City Hospital, with reference to the first importunate demands for immediate resort to the fluoroscope in almost any clinical situation. But the rational applications of the fluoroscopic screen attracted Williams at once, and some months later he wrote: ". . . it was the confidence I had in the possibilities of the fluoroscope to assist in the diagnosis of diseases of the lungs and heart that led me to begin and develop this method of examination . . ."[15] It was this internist's interest in the thorax and its topographical opportunities that resulted in his employment of the *open* screen; perhaps the first consistent use of this implement in this country. His predilection for the open screen was due also to his practice of making tracings, on glass, celluloid or the patient's skin, of his observations covering the entire thorax. For this at least one free hand was needed, and often two, for we must remember that foot-control of current-supply was unknown at that day, diaphragm-control was not to be exercised easily or quickly, and the behavior of the tube was governed by manipulation of bi-polar series spark-gaps controlled by rods. The infant focus-tube was usually obstreperous, and to "spare the rod" was to "spoil the child."

Williams' devotion to the fluoroscopic use of roentgen-rays naturally broadened his viewpoint as an internist to a degree quite beyond his time, because he perceived how the diagnostic powers of even the most skilful clinician might be amplified and refined thereby. "It has been said," he quoted in 1901 with thorough acquiescence, "that the 'x-rays are a most effective method of showing how great a rôle the imagination may play when using auscultation and percussion.'" By 1898, hardly over two years from Röntgen's discovery and through the medium of the fluoroscopic screen, Williams had discussed the application of the x-rays to the diagnosis of thoracic aneurysm, pericardial effusion, cardiac hypertrophy, cardiac transposition, emphysema, pleurisy with large or slight effusion, pneumothorax. hydropneumothorax and pulmonary tuberculosis.

Williams, of course, shared the common experience of the pioneer, whatever the undertaking. His belief and confidence in the revelations of the fluoroscope courted skepticism and even antagonism among his clinical colleagues. One of his publications on the subject was rewarded by this editorial appendage to a review of it:[16] "The author is evidently an enthusiast. It is unfortunate that he has confined himself so largely to work with the fluoroscope. Observations made in this manner are liable to errors of personal interpretation . . ." As if, forsooth, the findings derived from other clinical methods, not excepting radiographic methods, were not, on frequent occasion, disposed to the same weakness!

One cannot contemplate the development of roentgenoscopy without recurring to the contributions of that ingenious dental practitioner, William Rollins, whose name should have adorned the honorary roll of every radiologic society in the land. How many of us today are aware that he devised and used practically an intra-oral fluoroscope for the teeth, manipulated in the manner of the mouth-mirror? But it was as the faithful co-worker and mechanical genius of Francis Williams that he produced the extraordinary instrument he called the "seehear"—a fluorescent screen and a phonendoscopic diaphragm of equal size mounted in such relation to each other that the eye and ear of the examiner could appreciate conjointly the sights and sounds of the intrathoracic functions, or pathological departures from them.

Crane, of Kalamazoo, was another advocate of fluoroscopy in thoracic diagnosis whose contemporaneous enthusiasm was almost the equal of that of Williams. This was shown in a communication made by him as early as 1899,[7] in the course of which he describes his "skiameter," which, as its name implies, was a manual instrument for the mensuration of shadow-densities by means of a gauging scale, at first of metallic wires of varying cross-section and later of layers of tin-foil arranged in divers thicknesses. The depth of the given shadow beneath the screen surface could in this manner be determined from its intensity by an ingenious, if somewhat complex, application of mathematics. Crane's confidence in fluoroscopy was revealed by this sentence: "I trust that in this paper may be shown the superiority of the fluoroscope over the dry plate [the radiograph] in the examination of the lungs."

Williams and Crane, of course, were but two of a widely disseminated body of investigators that was moulding the advantages of scrutinizing inspection to the needs of thoracic diagnosis by means of the roentgenoscope, as it was now to be called, for, since the advent of the open screen, the term "fluoroscope," in the Edisonian sense, was no longer a comprehensive one. In this connection we should recall the names of Grunmach, Kienbock, Walsham, Holzknecht, Stubbert, Moritz, Levy-Dorn and Groedel, as well as that of Baetjer and certain of his American colleagues of a slightly later day. It is safe to say that some of these, by their support of thoracic fluoroscopy in terms of reason and conservatism, retarded the decline of the use of the roentgenoscope, while others, of more ardent enthusiasm, accelerated it—for a decline there was during the very early years of the present century. This reaction was the result of at least two influences, one of which was the increasing realization, especially among practical users of roentgen rays, that the fluorescent screen could be the source of very real danger to the operator. The first death from the effect of x-radiation in the United States, that of young Clarence Dally, an artisan of Mr. Edison at his West Orange laboratory, was recorded in 1904, and as late as 1905, Pfahler,[12] in a paper on the roentgen diagnosis of diseases of the lungs, admits his practical discontinuance of the use of the fluoroscope in the chest "because of its inaccuracy and of the dangers attending its use." Another influence making for such sentiment adverse to the practice of fluoroscopy was the steady improvement in radiographic methods, as shown by the creation of generating apparatus of more potent output and the development of intensifying screens of better quality; that is to say, of less granularity and phosphorescence.

But Research, in the meantime, remained true to her renown for courageous and persistent endeavor in the face of obstacles. Her devotees, so definitely aided by fluoroscopic methods in their investigations of the thorax and its contents, were not to be deterred by its anatomic boundaries. Below the diaphragm, as well, there was visceral motion to be scrutinized. There, the organic structures were not endowed with sufficient natural contrasts of light and shade to make them visible; obviously, they must be made visible by artificial means, and, since the intra-abdominal portion of the alimentary tract, at least, was a structure in which motility was a very important phase of its physiology, it must be observed with the screen even as, in the thorax, the organs of respiration and blood-circulation had been observed.

It is of record that the earliest attempt to render visible by artificial means the course of the esophagus and the contour of the stomach was made by Strauss,[14] of Berlin, who, in 1896, used for this purpose gelatine capsules charged with reduced iron oxid and bismuth subnitrate. The shadows of these capsules upon his fluoroscopic screen were most indefinite and Strauss was evidently soon discouraged. He relinquished his investigations because, as he writes, "they appear to me to be of less practical importance than the question of changes in translucency of pathologic new-growth to the roentgen rays."

The promptly subsequent work of Walsh, Hemmeter, Naegele, Benedict, Williams, Lester Leonard, Cannon, and others, employing products of the mineral kingdom *not* administered with food, is well known, but even more familiar to us are the famous investigations of Cannon on the digestive functions of the cat, whereby alimentary roentgen diagnosis was christened in a bread-and-milk suspension of the subnitrate of bismuth, the ritual of the ceremony being interpreted through the eminently proper medium of the fluorescent screen.

Many of us did not then realize, perhaps, the significance of Cannon's work and the manner of its doing. Many, through the following years of the first fluoroscopic depression, as one might call it, were timorous of the threatened physical danger in routine fluoroscopic procedure. On the other hand, many were smitten, almost overcome, by the charm of the rapidly developing attractions of radiography, that fascinating but occasionally disappointing damsel our Bavarian colleague, Rieder, in 1904, had taught us to woo. Up to the day of Rieder's epochal accomplishment with reference to alimentary topography and physiology, efforts at *depicting* the contours of these viscera were largely confined to tracings and to punctate outlinings, both of them fluoroscopic methods. Rieder's results served as immense stimulation to others—most widely, perhaps, in Europe, but also here as shown in the early work of Hulst in 1905, Pancoast (with others) in 1906, and Pfahler in 1907. In short, American skiagraphy of the alimentary tract was merely keeping pace with the steadily increasing excellence of our general roentgenography. Although the technical quality of the radiography of the European school was of notable merit, by 1910 we were abreast of it, thanks to the high standard set by Caldwell and other advocates of fastidious technic, and, within a short time, ahead of it.

Undoubtedly, this radiographic development of ours had continued for some years at the expense of our roentgenoscopy. It was probably an excellent thing for both the European and American schools of radiologic practice that we were visited in 1910 by Haenisch of Hamburg, then the associate of Professor Albers-Schoenberg, as an official delegate to our national society meeting. After the meeting he visited many of our individual laboratories. Writing, later, in the German *Fortschritte* of his impressions, he said, in part: "We were surprised to find how little use is made of roentgenoscopy. The unfortunate accidents which followed the excessive use of the fluoroscope in the early days of roentgenology have brought radioscopy into disrepute [in America] and only of late is this method beginning to be introduced by certain practitioners who have travelled in Europe and are convinced that for certain cases screen examination is absolutely essential. . . ."

"Certain practitioners," thus referred to, made up a group of which Pfahler, Williams, Hulst, Skinner, and others were ardent members, and as a whole the report of Haenisch described with reasonable accuracy the setting of the American radiologic stage at the moment of the entrance upon the scene of one who, by force of his example and the conviction created by his writings, aided mightily in putting to an end the first American fluoroscopic depression—Russell Carman.

The course of Carman's professional life as a roentgenologist may, as we know, be divided into his shorter Saint Louis period and his thirteen fruitful years at Rochester, where he labored so diligently and so effectively. At the beginning of 1913, the resources in material he found at the Mayo Clinic served immediately to stimulate his predilection for gastrointestinal investigation and the practice of roentgenoscopy it involved, of which the results of his work in Saint Louis had already given indication. He found at Rochester the sympathetic yet reasonably critical attitude of one's colleagues that means so much to the pioneer in any form of specialized endeavor, and which stimulates his coöperative activity to the same degree that colorless assenting agreement retards it. The practice of roentgenoscopy is essentially a matter of close relationship between practitioner and patient, permitting of no delegation to subordinate hands. Therein lies its purity as a true Æsculapian ministration. Thus, at Rochester, it was Carman's happy lot to remain what he had set out to be—a physician rather than a scientist of the laboratory; for, however we may misapply in the name of convenience, the noun "laboratory" in speaking of the seat of radiologic practice, or, for the same reason, carelessly use the term "clinician" in contradistinction to the status of the radiologist, the fact remains that radiology is and ever will be a clinical branch of the practice of Medicine.

It were impossible to amplify the true words already spoken, under this Lectureship, by Doctor Moore concerning the accomplishments of his preceptor, and the way in which they should influence the conduct of him who would undertake to solve the problems of roentgenology in abdominal diagnosis, but no consideration of the growth of American fluoroscopy could even approach completeness without a brief review of Carman's profound and salutary influence on it.

There is ample evidence in his writings to show that from the first moment of his radiologic activity he held the early investigations of Cannon in high appreciation. The fact that this work was based on the observation of visceral motion appealed to his sense of the importance of elucidating the presence of alimentary disease through the scrutiny of departures from the normal physiology. Thus he was moved to deplore the evident lack of early American interest in the future outcome of Cannon's contribution. It was over twenty-two years ago, as we were recovering from our first fluoroscopic depression, that Carman wrote:[11]

> "It is to be regretted that a method which gives promise of such an advance in methods of gastro-intestinal diagnosis, and which owes its inception to an American, Cannon of Boston, should have awakened in this country as yet so little interest as compared to that evinced by German and English clinicians and roentgenologists."

Carman's genius for roentgenoscopy was almost intuitive. Well before 1913, when one may say his broad contact with alimentary disease began, it had made itself evident. It was in 1910—the year, in fact, of Haenisch's report on the meager use of fluoroscopy in the United States—that Carman thus expressed himself, in dealing with the subject of medical roentgenology as a specialty:[1]

> "Roentgenoscopy deserves separate and praiseworthy mention. By the use of the fluoroscope and its modifications, the diagraphoscope and the orthodiagraph, physiologic and pathologic processes may be observed and studied *intra vitam.* Many of the phenomena of the circulation, of respiration, of digestion, can be seen in action. The progress of a peristaltic wave in the stomach, the pulsation of an aneurysm, the splashing of a pleural effusion, can all be viewed directly. *These must be seen on the screen, and not on the plate, to be of any direct value in diagnosis"*

And again, the following year:[2]

> ". . . it is not extreme to say that no x-ray examination of the chest or abdomen is complete without the use of the fluoroscope, and it should precede skiagraphy. . . . Upon the screen, living dynamic pathology is seen. On the other hand, the plate is a record of a single phase of conditions, which may be 'accidental or improvised,' as Holzknecht says."

These trenchant statements, made twenty-five years ago, may well be interpreted as Carman's confession of faith in the value of a procedure that had impressed him deeply from the early days of his medical career and which he applied consistently during the remainder of his life. As the immediate result of this application was formed the first expression of what may be termed the Carmanian influence on the present status of American roentgenoscopy. It is conveyed by these words:[2]

> "Emphasis must be laid upon the necessity of observers remaining in the dark for at least twenty minutes before beginning the examination. The eyes then become accustomed and details, which otherwise would be lost, are plainly seen."

This point, small as it seems to be now that a world-wide fluoroscopic routine is established, was then of the greatest importance, and one which Carman iterated frequently; so, in later years, when it became generally known that this pupillary preparation was a part of the Mayo practice, and, since suggestions *ex cathedra* usually carry more weight, one's clinical colleagues elsewhere, perhaps acutely concerned in a given fluoroscopic problem, became less impatient of what had seemed to them a silly and unnecessary delay, and less expectant of a brilliantly detailed screen image the instant they entered the realm of roentgenoscopy from the bright light outside it.

At the outset of his day's screening, Carman had a most palatable remedy for impatience of this sort. Who of us oldsters does not remember those preliminary moments of general conversation in the darkness of the screening-room at Rochester, as we waited for our pupils to dilate—pupils ourselves, for the moment, of a great fluoroscopist, and in the very pleasant meantime dilating freely on every conversational subject, *except* radiology, from motor cars down?

There can be no doubt of the weight of Carman's diagnostic work, especially his gastrointestinal roentgenoscopy, as affecting the readjustment of our statistics relative to the incidence of duodenal ulcer. In 1914, in one of his many discussions on the subject, he took occasion to raise a collateral point which has subsequently done much to establish closer *liaison* between hospital roentgen departments and other clinical services, surgery in particular. Said he:[4]

> "Notwithstanding the constantly growing mass of convincing statistics, many clinicians and especially a few gastroenterologists of this country and continental Europe are on record as claiming that duodenal ulcer is a lesion which rarely occurs. Their inability to recognize its frequency is probably due, as W. J. Mayo states, to the presence of the abdominal wall. Speaking from a radiologic point of view, I might say that during the last year only have I come to realize the frequency of this condition through following cases to operation and looking into the abdominal cavity with the surgeon. I would certainly recommend this procedure to those that are skeptical, because a large number of the patients treated for 'chronic dyspepsia' have duodenal ulcer. . . ."

That "year" to which Carman refers—his "year of realization," as it were—was his first year at Rochester. It is probable that, even at that early day, he carried with him to the operating room well thought-out diagnostic information which, more often than seldom, it was merely for surgery to corroborate. But what soon became apparent was the *spirit* in which he invariably approached the test of surgical revelation. Counterevidence or disproof, when it was forthcoming, he accepted in the acquiescence of the true scientist, nay, he welcomed it with the warm partisanship of the humanitarian if the findings redounded to the advantage of the patient. Carman early formed this habit of operating room attendance, and its obvious advantages to both surgeon and roentgenologist soon became generally recognized. Its constructive effect on the hospital roentgenologic units of the country was the creation of a spirit of thorough interdepartmental understanding and coördination through opportunity for truly clinical comparison of evidence. Who shall say that this spirit, now so generally manifested everywhere, is not another expression of the Carmanian influence on the status of American roentgenoscopy?

From Carman's habit of establishing and fostering such close clinical association with his colleagues, results of combined observation of the greatest worth were the inevitable outcome. Attesting to this is the exceedingly important communication of Carman and Balfour,[6] in 1915, in the matter of gastrojejunal ulcer. Up to that moment, consideration of this lesion had been preponderantly surgical, and roentgen-ray evidence in diagnosis, when utilized, had been inconclusive. Doctor Moore, from this rostrum last year, mentioned the far-reaching results of this report; for our consideration today be it said that the fourteen cases by way of illustration were accurately and in detail described on a basis of initial fluoroscopy. "Roentgenoscopy," writes Carman in this paper, "is particularly necessary in examinations for gastrojejunal ulcer," and proceeds, by the conclusions of the authors, to prove the truth of a statement that has since become an axiom. From the purely historical viewpoint this paper is equally important, for Carman's share in it gave him the opportunity to pour oil on the waters of controversy that were already becoming turbulent. His words reveal the nature of the discord:

> ". . . In every examination of the digestive tract both roentgenoscopy and roentgenography should be employed. They should not be regarded as independent competitive methods, but as complementary parts of one method, for exclusive reliance upon either alone is likely to result in overlooking some important feature of a case. . . ."

Carman had no taste for petty polemics. "Controversies, sometimes heated, but Pickwickian," as he once wittily classified them, were against his very nature, but in maintaining the larger defences of his position he was strong. It was this strength, added to the prominence of his station in American Medicine, that made his the protagonistic key-position in what has been loosely termed the "fluoroscopic school of thought" in roentgen diagnosis in this country, especially as applied to the digestive tract at the moment of which we are now speaking. This school of thought, or, more properly, of practice, "was an evolutionary product of the so-called Continental doctrine, in that its mode of investigation was basically roentgenoscopic, formulating its diagnosis, after the precepts of Holzknecht, on a factorial consideration of the 'symptom-complex' presenting in the given problem, as well as upon its radiographic records in confirmation." These principles had their advocates in men of such strength as Forssell, Haenisch, and Barclay and, in this country, among others, Crane, Hulst, Pfahler, Case, and Skinner.

Carman's breadth of mind embraced all phases of his work and permitted of no bigotry as to the infallibility of his theory and practice. His readiness to admit the possibility of their points of weakness or doubt seemed to amount almost to an obsession. He wrote entire papers on the limitations of roentgen diagnosis, but in the furtherance of any tenet that he had proven to be sound, he was as firm as bed-rock. The fact that the findings of roentgenoscopy played so important a part in the procurement of the data that gave to the work of Carman and Balfour its great value, together with the fact that this work showed conclusively that accurate and detailed circumstomal roentgen diagnosis may spell the difference between postoperative comfort and postoperative misery that "maketh the heart sick," would seem to indicate, it is believed, that herein lies yet another expression of the salutary Carmanian influence on the development of fluoroscopy.

By his display of common sense, Carman had done much, as has been said, to allay the growing fear of fluoroscopy which he found to exist when he entered the practice of radiology, and somewhat later, during the first year of his Rochester period, or, to be more exact, twenty-two years ago, in this city, in this month of June, by means of a paper describing his technical methods,[3] he gave voice to his views on the fluoroscopic depression brought about by an hysterical timidity that had taken the place of sensible caution. To those about to discard their fluoroscopic apparatus he suggested the exercise of temperance rather than prohibition. "I would not urge any roentgenologist," he said, "to take risks which to him seem imprudent and which might possibly result in his injury, but candor compels me to express my very sincere belief that we have gone from one extreme to the other, from extraordinary and ignorant rashness to extraordinary and unnecessary caution." He deplored the influence of this unnecessary caution as was shown in the heavy and unwieldy construction of much of the fluoroscopic apparatus of that day. Since this ponderous construction prevented effective access to the patient for purposes of palpation, Carman reasonably complained that "the screen examination, thus 'denatured,' loses half its interest and value." Those who were screening before Carman's day, or even contemporaneously with his earliest gastrointestinal practice, will be prepared to agree that this protest of his against such Gargantuan architecture in screening apparatus whereby, amid its pillars and flying buttresses, the person of the unprotesting patient became effectually shielded from all efforts of the palpating hand, was the beginning of a reactionary period of simplicity in the construction of these devices—another manifestation of the "Carmanian influence," but perhaps of lesser importance than many others, in spite of its specific value.

But this reaction in the direction of increased simplicity, while it had its permanent good effect on after years, became much too pronounced under the stress of the urgencies of the Great War. Roentgenoscopic practice constituted almost ninety per cent of the military radiologic activity in intermediate areas behind the dressing station zone and as far back as the base hospital. By the very simplicity of its construction, much of the apparatus in such areas was woefully inadequate as far as protection of the operator was concerned. At casualty clearing stations or evacuation hospitals, screening apparatus was necessarily of simple installation with a view to its quick removal in case of forced retirement.

Not many months after the close of the War, possible results of over-exposure to x-rays in the Service and otherwise were being noted in the occurrence of aplastic anemia and other blood dyscrasias. Perhaps because of the subtlety of these effects, perhaps by reason of wider publicity, greater agitation was created than had been the case fifteen years before. The second fluoroscopic depression was on; many relinquished completely the use of the screen, and roentgenoscopy seemed about to receive another periocular contusion, as it were. Russell Carman, however, from the stronghold of his now eminent position, treated its prodromal signs, as he had done previously, with the cold compress of common sense. His temperate attitude was matched by that of others of his peers who realized that any curtailment of the growing beneficence of roentgenoscopy was unthinkable, and that radiation-danger, not only to its devotees but in any form of radiologic practice, could be controlled only by concerted regulation of the element of protection, and not by haphazard effort. Accordingly, in 1920, the American Roentgen Ray Society formed its standing committee for roentgen-ray and radium protection. The movement was soon taken up by similar societies in Great Britain, and there had the strong and influential support of the National Physical Laboratory to a degree not as promptly reached by our National Bureau of Standards. The subsequent development of this activity is familiar to all; through Continental coöperation there has been created the International Committee on X-ray and Radium Protection, and among us there has appeared the Bureau of Standards Handbook on Roentgen-ray Protection.

In spite of these organized precautionary measures, to which the registered American radiologist must subscribe and comply, and thus may practise his profession with absolute safety to his patient and relative safety to himself, the untoward potentialities of uncontrolled fluoroscopic practice are still with us. There yet endures the unprincipled charlatan who, within the mystifying aura of the roentgenoscope, seeks to hoodwink his trusting victim as he shamelessly lies into credulous ears as to what the luminous screen reveals. We still have the manufacturer who is so far unmindful of the respect of the qualified radiologist that he continues to persuade the internist or the general practitioner of the advantage in the possession of a fluoroscope as a bit of decorative office furniture, which it is ultimately to become after producing its yield of disappointment. Also, there is the less serious matter of the commercially wolfish shoe dealer garbed in the sheep's clothing of science, as he asks us to enjoy, with him, by fluoroscope, the sublime vision of our *hallux valgus* which he proposes to fit, plus or minus, into the tight leather of vanity. Roentgenoscopy, with all our modern devices for protection of the operator, is still, in unpractised hands, a procedure potentially serious, to use no stronger an adjective. So is any manipulative undertaking wherein are combined the "personal equation" and a complex distribution of high-voltage electricity with the radiation phenomena attending it. The laws of physics may be impeccable, but human agencies are defective. Hence the value and applicability of the fluoroscopic observations of Barclay, of the University of Cambridge, or the more recent researches of the Americans Cilley, Leddy, and Kirklin.

During the later years of Carman's life, two events occurred which must have been to him exceptional sources of satisfaction. One of them was the amplification by Forssell and Åkerlund of Forssell's early work of 1912 on relief-demonstration of the alimentary mucosal folds. In this later elaboration, Carman could see developed one of the first manipulative adjuncts to fluoroscopy which he had practised and taught—screen observation under applied pressure; not mechanical pressure by cones or cylinders or balloons that since may have added to the accuracy of these observations, but pressure of his good right arm, with a "palpatory eye" at the tip of each finger! Carman's physique afforded him aid that no man of lesser build could hope for.

The other satisfaction must have been the fruition of the work which Moore authoritatively declares to be the great contribution of Carman's life—the discovery of the "meniscus sign" of ulcerating gastric cancer. With what pride Carman states in his report[5] that fluoroscopy is essential for the demonstration of this lesion, because manipulation is nearly always requisite for its exhibition—such was his fascination by the rewards of palpatory effort!

Radiologists of Minnesota: To you especially has been given a great heritage. How well, already, you have utilized this heritage may be seen from the quality of the research that has resulted from your energies. Of this none can speak more truly than one who has scrutinized of late the literature of the science of diagnostic radiology. Continue to hold fast and be true to the principles inherent in this bequest. Be rejoiced in your power to pursue the art of fluoroscopy in its Carmanian sense, which exemplifies the true and hallowed relation between physician and patient. Apply that power with the sympathy and the understanding that was his.

Friends and allies of radiology in other special fields or in general medicine: It cannot be difficult for you to appreciate how close a bond between us has been woven by the natural gifts of a man whose useful life has been so influential in converting into a clinical art the applications of a natural phenomenon which forty years ago was revealed to the gentle Professor of Physics in that modest laboratory at Würzburg. May this bond serve further to interlock securely, and ever in the interest of those in need of succor, the fine traditions of your calling and the high principles of practice laid down by Carman and now carried out by his former colleagues and disciples throughout your state of Minnesota.

Together we must lift high the lamp of Learning. The higher we raise it, the more widely will fall the rays of its glowing flame, its sustaining essence refined and purified by the spirit of such as Russell Carman!

References

1. Carman, R. D.: Medical roentgenology as a specialty. Jour. Missouri State Med. Assn., 7:121, 1910.
2. Carman, R. D.: The diagraphoscope. St. Louis Med. Rev., 60: (5 n. s.) 198, 1911.
3. Carman, R. D.: The technic of roentgen-ray examinations of the gastro-intestinal tract, and the interpretation of the screen and plate findings. Jour. A. M. A., 61:321, 1913.
4. Carman, R. D.: Radiologic signs of duodenal ulcer, with especial reference to gastric hyperperistalsis. Jour. A. M. A., 62:980, 1914.
5. Carman, R. D.: A new roentgen-ray sign of ulcerating gastric cancer. Jour. A. M. A., 77:990, 1921.
6. Carman, R. D., and Balfour, D. C.: Gastrojejunal ulcers; their roentgenologic and surgical aspects. Jour. A. M. A., 65:227, 1915.
7. Crane, A. W.: Skiagraphy of the respiratory organs. Phila. Monthly Med. Jour., 1:154, 1899.
8. Edison, Thomas A.: Quoted in American Journal of Photography, 27:160, 1896.
9. Glasser, Otto: Wilhelm Conrad Röntgen and the Early History of the Roentgen Rays. Springfield (Ill.) and Baltimore: C. C. Thomas, 1934.
10. Hammer, E. W.: Trans. Am. Institute Electrical Engineers, 1903.
11. Mills, R. W., and Carman, R. D.: The x-ray in the diagnosis of gastric ulcer and its sequelæ. Surg., Gynec. and Obstet., 17:1, 1913.
12. Pfahler, G. E.: Roentgen diagnosis of diseases of the lungs. Jour. A. M. A., 46:23, 1906.
13. Salvioni, E.: Proc. Accademia Medico-Chirurgica di Perugia, 8: No. 1-2, (Feb. 8) 1896.
14. Strauss: Beitrag sur Wurdigung der diagnostischen Bedeutung der Röntgen-durchleuchtung. Deutsche Med. Wchnschr., 22:161, 1896.
15. Williams, F. H.: The uses of the fluoroscope. Communications of the Massachusetts Medical Society, 17:858, 1896-98.
16. Williams, F. H.: Quoted by Crane. Loc. cit. ref. 7.

THE PROGNOSIS AND TREATMENT OF CORONARY OCCLUSION*

WILLIAM S. MIDDLETON, M.D.

Madison, Wisconsin

> "And he will manage the cure best who has foreseen what is to happen from the present state of matters."—Hippocrates, *The Book of Prognostics.*

THE natural evolution of the knowledge of disease has usually been from diagnosis to therapy and prognosis. The accurate clinico-pathological correlation of disease processes was the great contribution of the French school of the late eighteenth and early nineteenth centuries. Nor has the necessity for this function passed. Bacteriology gave a tremendous impetus to this growth and by establishing the etiology of the several infectious diseases not only facilitated their diagnosis but also paved the way for the use of specific biologic agents in their prophylaxis and treatment. The application of physiological and biochemical methods to the study of clinical problems has opened a new vista in the early and the more complete appreciation of disease. Still, the clinical recognition of a disease will anticipate the consideration of its prognosis and treatment in most instances.

Coronary occlusion is no exception to this general rule. The first intra-vitam recognition of coronary thrombosis was reported by Hammer[30] in 1878. The classical clinico-pathological consideration of the subject by Dock[16] followed eighteen years later. Still no general interest appears to have been aroused in the matter until its clinical implications were driven home by Obratzow and Strachesko[62] and by Herrick[31] in 1910 and 1912, respectively. The triad of subjective manifestations suggested by Obratzow and Strachesko, status anginosus, status dyspnœicus and status gastralgicus, satisfied the clinical requirements of clarity, brevity and applicability. In the intervening years the picture has been amplified, so that today the bedside recognition of coronary occlusion is a commonplace.

---

*From the Department of Medicine, University of Wisconsin.

Diagnosis held sway in all of the earlier discussions of coronary occlusion. True, Herrick[31] suggested the possibility of survival of certain patients after this accident; but the prognosis had little place in the literature of the subject until the past decade. Since then Levine,[45] Herrick,[32] Christian,[12] Pardee,[65] Jegorow,[38] Luten,[52] Burton and his fellow workers,[11] Evans[18] and others stimulated interest in the prognosis of coronary occlusion by recitals of recovery. Comprehensive studies of this phase of the subject by White,[92] Parkinson and Bedford,[66] Levine,[46] Conner and Holt,[13] and White and Bland[94] have served to extend the clinical interest in the prognosis and treatment of coronary occlusion.

An adequate appreciation of the possibility of survival after occlusion of a coronary arterial branch depends upon an understanding of the basic anatomic facts and of pathologic principles as applied to this system of vessels. Gross[27] and Spalteholz[83] have evolved masterly descriptions of the blood supply of the myocardium. Briefly stated,[27] the right coronary artery is responsible for the nutrition of the entire right ventricle with the exception of the left third of its anterior wall, where the branches of the left coronary artery extend. The left coronary artery supplies the anterior wall of the left ventricle and the left half of its posterior wall, whereas the right coronary artery affords nutrition to the right half of the posterior wall of this chamber. The left coronary artery supplies the anterior portion of the interventricular septum, and the right coronary the posterior portion. A dual supply may be anticipated in the zones of approximation of these independent sources of nutrition. Sixty per cent of the studied hearts derived the blood supply for the sino-auricular node from the right coronary artery, while the auriculo-ventricular node was supplied by the right coronary artery in 92 per cent of the studied cases. The right limb of the auriculo-ventricular bundle is nourished by the left coronary artery, and the left limb by branches of both coronary arteries. It is impossible to generalize the distribution of the coronary vessels to the auricles.

From a prognostic standpoint the question of anastomoses assumes a vital importance in event of a coronary occlusion. Without a reasonably adequate collateral blood supply, occlusion of a coronary arterial branch of any size must inevitably terminate fatally. The earlier experimental studies of Porter[68] upon the effects of ligation of the coronary arteries supported the view that cardiac arrest bore a direct relation to the caliber of the coronary vessel ligated and such anastomoses as existed were inadequate for collateral circulation. Miller and Matthews[58] found that successive ligations of major branches of the left coronary artery ended fatally, but the ligation of either of its main branches was attended by cardiac failure only after 1 to 3 months. Fortunately in the interest of clarity the Weigert-Cohnheim controversy has finally been settled through the definition of anastomoses between the coronary vessels by Hirsch and Splateholz.[35] Wearn and his fellows[37,89,90] have contributed extensively to the knowledge of this detail. Small but widespread communications with branches of the internal mammary artery and anterior branches of the thoracic aorta (mediastinal, pericardial, bronchial, superior phrenic, intercostal and esophageal arteries) were established by injection studies of the coronary vessels. These anastomoses were abundant through the arteriæ telæ adiposæ and about the great vessels leaving and entering the heart, those about the pulmonary veins being especially notable. More significant perhaps have been their observations relative to the nutrient possibilities of the vessels of Thebesius in event of coronary occlusion. To these vessels, which they divided into the arterio-luminal vessels, arterio-sinusoidal vessels, and myocardial sinusoids, they attribute a major place in replacement of the coronary arterial function after extensive occlusion. Grant and Viko[26] limited the connections between the coronary arteries and the Thebesian vessels to channels of capillary dimensions. Furthermore, Stella[84] maintained that blood flows through these vessels only in diastole and by inference minimized their functional importance. Against this adverse evidence may be arrayed a growing series of survivals after occlusion of both major coronary arteries.[7,44,75,78] A further collateral source of nutrition was suggested by Thorel[85] in the vascularization of the impoverished myocardium in case of coronary occlusion through pericardial adhesions. Moritz, Hudson and Orgain's[59] injection studies of four hearts, the seat of extensive pericardial adhesions but without coronary disease, confirmed this position by establishing widespread anastomoses of the coronary arteries with the internal mammary arteries and anterior branches of the aorta through such adhesions.

As early as 1880 Weigert[91] suggested a possible protective mechanism on the part of nature in providing collateral paths of nutrition in case of coronary encroachment. Dock[16] subscribed to the same view. Gross[27] proved that such pathways became more abundant and adequate with advancing years. Galli[23] placed this matter on a sound footing by proving that gradual occlusion of the branches of the coronary arteries was a vital factor in assuring ample anastomoses. Finally, Oberhelman and Le Count[61] by injection studies of diseased and normal hearts found adequate collateral circulation only in those with antecedent coronary sclerosis. In the absence of such sclerotic changes either a total lack or an inadequacy of such anastomotic channels was observed.

The natural implication from such observations[61] was that the outcome of coronary occlusion depended upon three important factors, namely the size and importance of the obstructed artery, pre-existent channels and time to render such anastomoses effective. Coronary occlusion may develop gradually or suddenly. If embolism be omitted from the present consideration by reason of its infrequence and special implications, coronary sclerosis is the common background of the acute and the chronic types of occlusion. Von Leyden[87] thus classified the changes incident to coronary obstruction:

1. Sclerosis, without myocardial change which presupposes an intact nutrition until sudden occlusion.
2. Infarction with myomalacia cordis.
3. Slower occlusion with myofibrosis which may occur diffusely or in patches and which may result in aneurysm of the heart.
4. Combinations of these types.

With myocardial infarction there occurs quite commonly a reactive pericarditis. An effusion may result or adhesions between the two layers of the pericardium may afford an appreciable support and at the same time lend an unusual source of nutrition to the impoverished myocardium.[85] Eventually such adhesions may increase the work of the heart. Within the chambers of the heart overlying the areas of infarction, especially in event of aneurysmal dilatation, mural thrombi may form carrying with them the threat of detached particles which may act as remote emboli. Acute coronary occlusion from a septic embolus may lead to abscess of the myocardium. Otherwise the pathologic sequences from coronary embolism parallel in general those of thrombosis.

So intimately is the fate of the victim of coronary occlusion tied up with the sequences of events in the affected myocardium and the time relationships incident thereto that attention is next directed to these details. Obviously an artery of a very small size or with an adequate collateral relationship, may be occluded without serious consequence and perhaps without clinical evidence of its occurrence. Admitting appreciable encroachment upon the nutrition of a segment of the heart wall, in only a minority of cases may one hope for a relatively complete restoration of an adequate blood supply and escape from structural changes through full anastomotic branches or canalization of the occluding thrombus. The area of infarction is invariably smaller than the actual distribution of the occluded artery. The anterior apical portion of left ventricle supplied by the descendens branch of the left coronary artery is only slightly more frequently obstructed than is the posterior basal portion of the left ventricle supplied by the right coronary artery.[5] Levine[46] summarized the pathological changes in the myocardium incident to coronary thrombosis in this manner: Edema and hemorrhagic extravasation characterize the first three or four days; then necrosis dominates the picture from the fourth day to the end of the third week; finally, repair, which is remarked as early as the sixth or seventh day, does not become a striking feature until after the third week and does not appear adequate until more than five weeks have elapsed. The infarcted zone of the myocardium may eventually be the seat of dense calcium deposits.[15,36] These pathological observations have an extremely important clinical bearing upon the prognosis and treatment.

Death from coronary occlusion may result from one of a series of causes. Fulton[22] recorded death from embolism, myocardial impoverishment, rupture of the heart and interference with conduction. It is generally admitted that a considerable percentage of patients succumb to attacks of acute coronary occlusion before medical attention can be had. In this group still fall the dwindling cases of so-called acute indigestion, for the elucidation of which students of coronary disease have done so much. Levine[46] pointed out the frequent responsibility of ventricular fibrillation for this manner of death from coronary occlusion. As may be gathered from a perusal of the pathologic sequences in an area of myocardial infarction, the fourth to the fifteenth day is the period of most serious threat from rupture of the heart. At any time in the first three weeks the patient may die from embolism to the brain, or to other important organs. After the third week the patient is relatively safe on this score. Having escaped these more acute manners of exodus, the myocardium may gradually become incompetent and the classical symptoms of congestive failure supervene after a period of weeks or months.

Willius[95] epitomized the situation by stating that one-half of the cases of coronary occlusion die at the time of the attack or in a few days. The survivors live a few months to several years, with varying degrees of cardiac handicap. White,[93] on the other hand, related an extraordinary example of longevity after coronary occlusion. His patient, a man of sixty-three years at the time of the attack, resumed his normal activities after several months of rest. Ten years after the coronary episode he indulged in strenuous mountain-climbing without circulatory embarrassment. Death at the age of eighty years was occasioned by apoplexy and at necropsy the heart revealed essentially only the dense scar of the healed infarct. Parkinson and Bedford[66] were able to trace the course of 99 of their 100 patients with coronary thrombosis. Of the surviving 68, the duration of life to the time of the study exceeded 5 years in 2, ranged from 2 to 5 years in 9, 1 to 2 years in 19 and up to 1 year in 38. The obvious criticism of a wide scatter of insufficient data detracts from this report. Then, too, the length of time covered is very short. In Levine's group of 143 cases[46] the immediate mortality was 53 per cent. The duration of life in the survivors from the acute episode (42 still living) was twenty-four months. The series of Conner and Holt[13] revealed an immediate mortality of 16.2 per cent. Of the surviving 117 patients, 75 per cent were in good health at the end of one year; 56 per cent at the end of two years; 21 per cent at the end of five years, and 3.4 per cent after ten years. Of the patients having a single attack one-half are living and one-third are in good health. A single patient remained in good health for seventeen years and died in a second attack of coronary thrombosis eighteen years after the first episode. In 1931, White and Bland[94] reviewed their series of 200 cases of coronary thrombosis. Of this group, 101 patients died an average of 1.5 years after the accident. The duration of life for the entire 200 patients was 2.4 years at the time of the report. A patient with coronary thrombosis reported before the Minnesota State Medical Association in 1927[56] is still alive and active nine years after his accident. Although he plays eighteen holes of golf each day without the slightest discomfort, there is some dyspnea on mounting a flight of stairs. The electrocardiogram shows rather low voltage (6 mm.) and there is a perceptible elevation of ST_2 as the sole remnants of a classical T type of change from infarction of the anterior wall of the left ventricle.[6,67] Fluoroscopy revealed an adhesion between the tip of the left ventricle and the parietal pericardium. In a recent report Cooksey[14] found 78.1 per cent of thirty-two survivors from coronary occlusion restored in such measure as to permit of a complete resumption of normal activities.

The prognosis of coronary thrombosis is admittedly very difficult and a reflection upon the numerous cited variables offers a partial explanation of the problem. It is moreover a strictly individualized question and generalities must be viewed with this reservation always in mind. Age is an important factor in prognosis. While advancing years and sclerosis prepare the collateral channels against the accident of coronary occlusion, there is always the probability of a concomitant myocardial malnutrition and resultant fibrosis from these sources. The general experience gives a more favorable prognosis to the younger subject with antecedent sclerosis. For example Levine[46] found the average age of his surviving patients to be 54.7 years as compared with the 61 years of the fatal group. Having recovered from the immediate episode it is significant that the younger individual more regularly resumes a fuller share of his previous activities.[14,46] Although coronary occlusion is much more frequent in men than in women, this circumstance apparently has no bearing upon the prognosis. An analysis of forty-four cases from the Wisconsin General Hospital substantiates these details. Likewise as reported by Levine[46] and Conner and Holt[13] our series shows no apparent discrepancies among the diabetics and hypertensives as compared with the general group. Syphilis was a predisposing factor in only one of our group in whom death occurred eight months after thrombosis of the right coronary artery with infarction of the posterior basal portion of the left ventricle.

Pain, the most striking subjective manifestation of the coronary occlusion as a rule, may be a useful prognostic sign or it may be completely misleading. Conner and Holt[13] found some correlation between the severity of the pain and the gravity of the outlook; in general the more severe the pain, the higher the mortality. On the other hand, their figures afford enough exceptions to militate against a wide acceptance of this criterion in prognosis. In our experience some of the most ominous attacks are either mild or free from pain. Angina sine dolore may occur independently of an altered rhythm and is a symptom-complex of unusually grave portent in coronary occlusion. Unquestionably certain cases so designated may, as Wayne and Graybill[88] reported, depend upon disturbed rhythm; but Herrick[33] and others have called attention to so-called painless attacks of coronary occlusion. Obratzow and Strachesko[62] denominated the suffocative dyspnea as a pain equivalent and, as Herrick[33] pointed out, the rapid fall in blood pressure may be a further substitution or replacement phenomenon.

One notable instance of this order in our group is recalled to mind. The patient, a white male sixty-four years of age, was accustomed to run short distances to or from work when his tasks as a janitor did not afford adequate exercise. Without warning he was stricken with dull pain beneath the lower sternum. This pain became progressively worse, to assume overwhelming proportions; whereupon he fainted. Upon admittance to the hospital he was in profound shock and the blood pressure on frequent determinations through this day ranged from 65 to 90 mm. Hg. systolic. Thereafter, on three occasions one to four days later, the patient experienced "sinking" spells or attacks of weakness in which the systolic blood pressure fell from slightly over 100 mm. Hg. to 80 or 90 mm. Restlessness and apprehension were conspicuous concomitants of each of these episodes and a leaky, clammy skin with gray pallor was regularly present at such times. The electrocardiograms were characteristic of infarction of the anterior wall of the left ventricle.[6,67] A retrograde propagated thrombus starting from the initial site in the descendens branch of the left coronary artery and involving the orifices of successive branches of this vessel was postulated in explanation of the striking clinical course. The patient succumbed on the fifth day after the coronary accident from rupture of the left ventricle. The original thrombosis had occurred rather low in the descendens branch of the left coronary artery and rupture of the heart had taken place through the necrotic infarct; but of particular interest was the ready tracing of the thrombosis propagated upward to involve a sequence of the larger branches of the left descendens artery. In concluding this detail it should be emphasized that, important though pain may be in a prognostic relation, its absence or the occurrence of equivalents in respiratory and circulatory symptoms should always be considered an ill omen.

The mental status of the patient with coronary occlusion takes unusual prominence in evaluating the prognosis. Early apprehension is the rule. Then having weathered the initial storm the physician must be alert to the reaction. Too frequently the fear of the early phase gives way to a remarkable euphoria. This state of mind is importantly controlled from the standpoint of treatment; but it must never be misleading, since it is often the calm before the delayed storm. Not infrequently the mental anxiety persists and one is taxed to learn whether it is cause or effect. Certainly it is not unusual to have recurrent thrombosis in this group of patients. Delusionary, hallucinatory and illusionary states may complicate the mental picture and render the outlook more dangerous. Unconsciousness from the outset gives a particularly bad prognosis.

The curve of the arterial blood pressure is one of the most important criteria of the clinical course and the outcome of coronary occlusion. In the first place it must be borne in mind that the fall in the blood pressure subsequent to coronary occlusion is relative. Accordingly a hypertensive subject may have levels of blood pressure persistently above normal but at a distinctly sub-natural level for himself after this accident. Not only is the degree significant in this relation, but the maintenance of a low or falling arterial pressure thereafter is particularly ominous. The duration of the relative or absolute arterial hypotension is an important index of the extent of myocardial damage, although survival and a resumption of a reasonable measure of physical activity may occur in individuals where very low pressures have been recorded for weeks after the occlusion. Of course, this tendency is not without its compensations, since Levine,[45] Herrick[32] and others have stressed the disappearance of pain dependent upon the lowered blood pressure that may succeed coronary thrombosis. With the falling or maintained low arterial pressure may be anticipated a leaky clammy skin and a rapid thready pulse.

Turning to the further examination of the circulation, cyanosis and dyspnea arrest the attention. As pain equivalents their importance in prognosis has already been discussed; but as evidence of beginning or continued circulatory incompetency they are given further weight. Particularly is this true when there is added pulmonary edema. These signs may be paroxysmal or continued. The prognosis is much better in the former type; and if these manifestations be explained on the basis of left heart failure, their disappearance will be reassuring. Evidences of congestive failure may supervene; and, although commonly delayed, their occurrence spells the end of at least one episode of circulatory balance. Of course, decompensation from myocardial incompetency on a coronary background may be controlled repeatedly by proper measures in a given individual, but the margin of safety is narrow and the occasion of cardiac failure sooner or later arrives in such a subject when treatment is unavailing. A glance at the reserve force of such a heart from time to time may enable the clinician to forecast and even forestall too early an expenditure of the cardiac reserve.

The heart itself may give valuable prognostic information in the early phases of the story. Antecedent disease and cardiac hypertrophy may be taken as presumptive evidence of a poorer prospect. The cardiac tones have a definite place in forming this composite picture. They may be extremely feeble. Tick-tock and embryocardiac sounds are very bad omens. Withal a peculiar mushiness of muscular tones and the appearance of murmurs of relative valvular insufficiency should be given their due weight. Arrhythmias, subsequent to coronary occlusion, bear a serious significance. Particularly is this true of auricular fibrillation, flutter and the various types of heart block. The persistence of such irregularities is even more ominous than their transient incidence, although Levine[46] found no higher mortality in those patients having auricular fibrillation, extrasystoles or partial heart block subsequent to coronary occlusion. He felt that complete heart block and ventricular tachycardia probably carried greater threats to life. Contrary to Levine,[46] in our series the occurrence of a pericardial friction did not increase the gravity of the prognosis. Remote embolism, serious in itself as a basis for disability and death, carries the added implication of intracardiac thrombosis.

The constitutional reaction to the myocardial infarction varies widely in different individuals. Neither the degree nor the duration of the fever bears any fixed relation to the clinical course and the outcome. In general the higher and more continued the fever the more serious will be the prognosis. Libman's observation[50] of the leukocytic response to coronary thrombosis and infarction has been generally confirmed. The polymorphonuclear leukocytosis, which may anticipate the fever and occur independently of the reactive pericarditis, is apparently a more delicate index of the status of the infarction than is the fever. Accordingly close observations of the numerical and the differential white blood pictures may afford valuable information as to the course of the myocardial process. Isolated counts are inconclusive and even the more detailed studies lack finality. Libman[50] pointed out that no case of coronary thrombosis failed to show a leukocytosis which might begin as early as 1 hour and 45 minutes after the attack. In his judgment a long continued leukocytosis indicated either a pulmonary complication or an intraventricular thrombus.

The recent observations relative to the sedimentation rate of the erythrocytes in coronary thrombosis must be cited in this direction. In 1931 Wollheim[96] mentioned the increased sedimentation speed in this condition without further comment. Shortly thereafter Rabinovitz and his co-workers[70] remarked the appearance of this phenomenon somewhat later than the fever and the leukocytosis. Furthermore the speeding of the sedimentation rate persisted after the subsidence of these two factors. In their judgment its determination served as a better index of the healing of the myomalacia than the fever or the leukocytosis. They did not commit themselves to a parallelism between the degree of myocardial change and the sedimentation speed. Since then, Burak,[10] Singer[77] and Bickel and his fellows[8] have confirmed the regularity of its occurrence and have given it unusual prognostic significance. The last named concluded that while the sedimentation speed was not always proportional to the gravity of the pathologic process, if there were no infection, a more rapid rate of sedimentation always indicated a continued cellular disintegration. In their judgment it served as one of the most reliable indices of recovery.

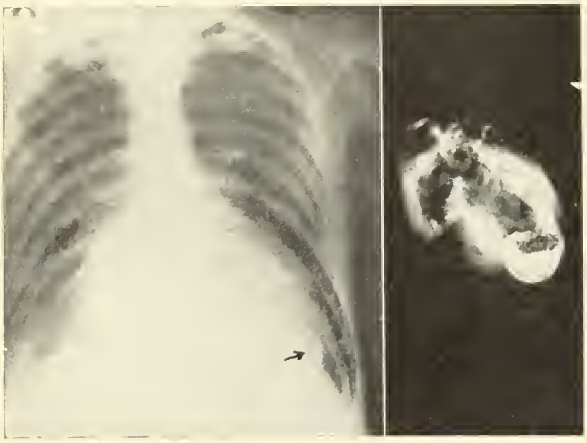


Fig. 1. Roentgenograms of chest and of heart (distorted somewhat by postmortem incisions) showing calcified infarct and intracardiac thrombus.

Roentgenology affords information of value in the visualization of the size and the contour of the heart. Obviously progress studies from the time of the coronary accident (and if possible anticipating the same) would give valuable data relative to these details. Orthodiascopy has served a further function in delimiting areas of infarction by the same principle of inelasticity or failure to respond to the wave of cardiac contraction that is remarked in the indurated area of a peptic ulcer in the stomach failing to participate in the orderly gastric peristalsis when viewed under the fluoroscope. Localized pouching or bulges may fix the site of aneurysmal dilatations of the ventricles. Obviously the subject must be investigated in all positions to throw the infarcted area into proper silhouette. Occasionally calcium deposits in the devitalized heart muscle may be demonstrated through the characteristic density.[15,36] Four instances of this order have been encountered in our series (Fig. 1). Obviously these observations will more importantly afford an objective measure of the location and extent of the deformity than supply prognostic information.

From the early observations of Smith[79,80] upon the electrocardiographic results of ligating the coronary arteries of the dog, a world wide interest in the clinical application of the principles involved has led to many important contributions to the diagnostic features of the tracings in coronary thrombosis. A volume could be written on the subject and it has not yet been exhausted. The prognostic significance of the electrocardiographic changes has not been completely settled. If it be admitted that the characteristic electrocardiographic changes succeeding coronary occlusion are dependent upon myocardial injury, Oppenheimer and Rothschild[63] conclude that the prognosis would be better in event of a normal electrocardiogram. Extended experience has stressed the importance of repeated electrocardiographic studies in tracing the course and in attempting to fix a prognostic value upon certain changes in the constituent complexes. Transitions may be remarked from normality to pathologic configurations (Fig. 2). Then the recuperation may likewise be followed in sequence to or approaching the prethrombotic curves (Fig. 3). Pardee[64] assumed that the T wave deflection arose from the reaction of repair about the area of infarction. Parkinson and Bedford[67] in an illuminating study attributed the electrocardiographic changes, especially in the T waves, to edema and leukocytic infiltration after infarction. The RT deflection was ascribed to the frank necrosis of the heart muscle. Accordingly they assumed the subsidence of these deviations to depend upon recovery of myocardial function. Certainly they are observed to occur coincidently with the maintained recovery of the blood pressure and improved circulatory competency. Hamburger[29] concluded that the prognosis was not good if the T wave remained negative, or if the inverted T wave were associated with further evidence of widespread myocardial injury, such as arborization or bundle branch block. Conner and Holt[13] concurred in these details. Barnes' recent analysis[4] was especially illuminating. He concluded that a low voltage in the ventricular complexes of all leads was a bad prognostic sign. In his extended experience the low voltage QRS waves occurred twice as frequently among those dying as among the survivors. Furthermore, typical T_1 and T_3 formulæ carried a better prognosis in that they appeared six times as commonly as the atypical curves in those recovering from the coronary accident. Barnes noted that atypical tracings were frequently associated with multiple in-

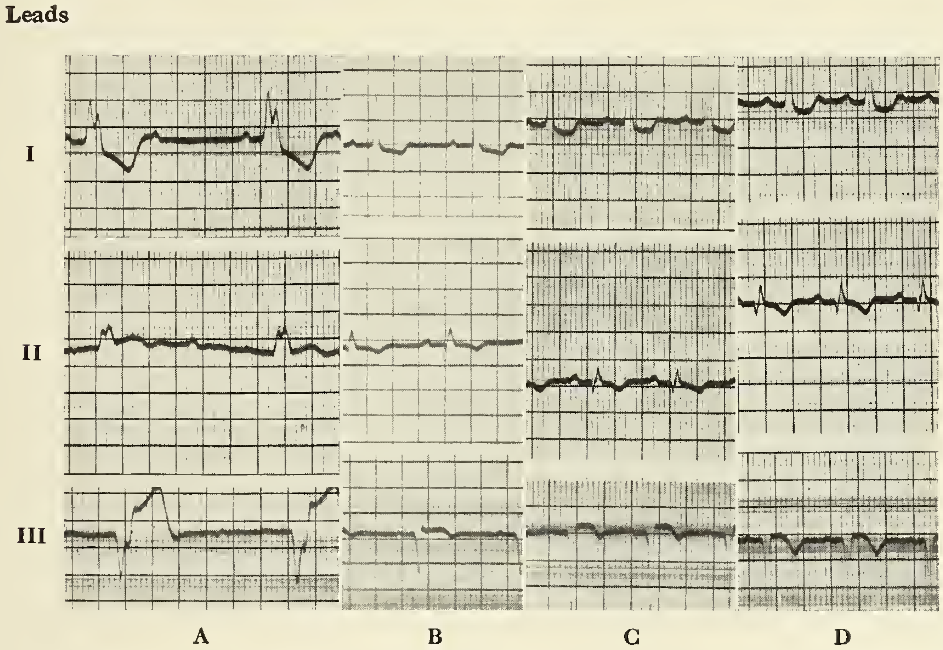


Fig. 2. Electrocardiographic progress studies in a subject with infarction of the posterior wall of the left ventricle. Intervals after coronary occlusion: A—6 days; B—12 days; C—54 days; D—68 days.

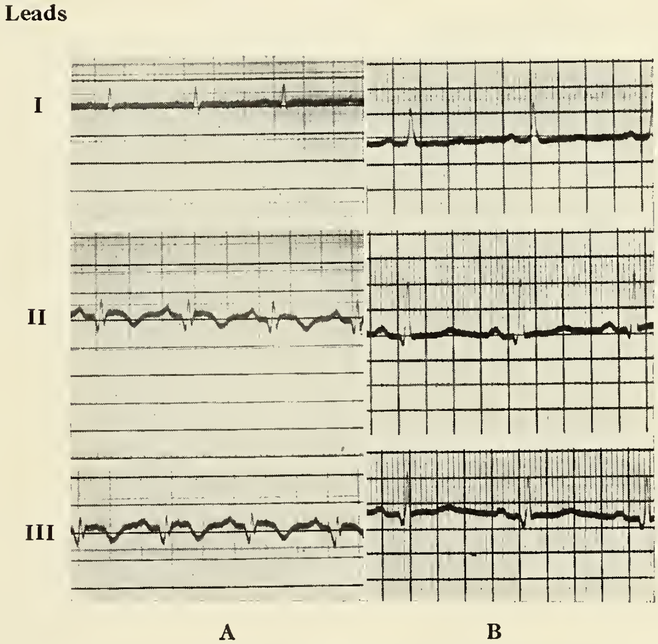


Fig. 3. Marked electrocardiographic recovery after infarction of the posterior wall of the left ventricle. Intervals after coronary occlusion: A—21 days; B—4.5 years.

farcts, extensive overriding infarcts or in infarction complicated by pericarditis.

In few clinical problems does the outcome depend so completely upon the absolute coöperation of the patient as does coronary occlusion. Rest is imperative and during the acute phase of the episode, this implies release from mental as well as physical stress and strain. Complete rest in bed must be enjoined for a period of at least six weeks, or longer if the clinical indications persist. The recurrence of paroxysmal dyspnea, cardiac consciousness, fatigue or other suggestive details should be taken as indications for caution and extended rest. The use of sedative drugs begins with the frank inception of the occlusion. Here morphine is of great value in quieting the patient, although it is usually ineffectual in controlling the pain. Morphine must be used in full therapeutic doses. There is no standard or mean. After the acute attack particular precautions should be taken to limit the patient's contacts and to exclude from the sickroom the cares and excitements of the daily life of the household, business and community. Visitors should be reduced to a number and type that will not tax the strength of the patient nor exact needless expenditure of energy. The patient must not be expected to entertain. Mildly sedative drugs as the bromides and the barbiturates may serve the useful purpose of raising the patient's threshold of reactivity, thereby reducing his response to external stimuli.

Oxygen is beyond a question of doubt the most useful drug at our avail in coronary occlusion. Rizer[72] first suggested its clinical use in this relation in 1929. Using atmospheres containing 50 volumes per cent oxygen he remarked relief from pain in as short an interval as two minutes. This result has been repeatedly confirmed by many clinicians. The reports of Levy and Barach[2,3,47] have been particularly convincing. They state, "In some instances effective use of oxygen may be responsible for the saving of life." These workers utilize a 50 volumes per cent oxygen in a tent for five days. Our experience has led us to use 40 to 60 volumes per cent oxygen through a nasal catheter over a period of at least two weeks. The manner of administration is of secondary importance. A decline in the general condition with an acceleration of the pulse rate attends premature withdrawal of this support. As measures of its advantage Barach and Levy[3] cited the following: striking subjective improvement in the relief of pain, less labored and slower respiration, control of the restlessness (sufficient to eliminate the need of morphine), diminution or abolition of the cyanosis and Cheyne-Stokes respiration (if present), fall in the temperature (if elevated), slowing of the heart rate and improvement in the general circulatory state.

The mechanism of these remarkable results from oxygen therapy in coronary occlusion are not entirely self-evident. Of course, it is clear that the anoxemia resultant upon the embarrassed circulation is relieved and the functional capacity of the myocardium is forthwith improved. This circumstance might explain all of the benefits from oxygen inhalation in coronary occlusion with the conspicuous exception of the relief of the excruciating pain. Haldane[28] has written, "Partial anoxemia means not a mere slowing down of life, but progressive and perhaps irreparable damage to living structure." MacWilliam and Webster[53] in a series of ergometer experiments upon the "congested" and "ischemic" arm found that there was little sensation with the arm at rest but on effort the fatigue point was speeded and the fatigue was acutely painful. This result was likened to angina where pain occurred upon effort in the presence of an inadequate blood supply to the myocardium. Lewis,[48] Resnik[71] and others have demonstrated the apparent causal relationship of anoxemia and the products of asphyxia to a series of faults in conduction. In 1931 Lewis, Pickering and Rothschild[49] convincingly proved that there occurred no vascular spasm concomitant with the pain of effort with inadequate blood supply. They postulate the existence of a P factor, a metabolite developed within the muscle but not directly resultant from the anoxemia. Its accumulation and the excitation of pain arise from faulty circulatory removal. Kissin[41] noted that pain in the exercised muscles of the forearm after arterial constriction was relieved by the inhalation of oxygen. The electrocardiographic curves of coronary occlusion have been closely approximated by local and general anoxemia.[20,40,42,76]

From a clinico-pathologic viewpoint it has been difficult to reconcile the relief of pain from oxygen therapy in coronary occlusion to a simple control of anoxemia. The zone of myomalacia is strictly speaking without the free circulation. Hence its oxygenation can not be favored by raising the available oxygen in the respired air. The myocardial nutrition is favored by this expedient and it is conceivable that the mobilization of the P factor (or other metabolite) as suggested by Rothschild and Kissin[73] and by Katz[39] may be facilitated by this procedure. A further insight into the biochemical reactions attendant upon coronary occlusion is afforded by the work of Himrich, Goldfarb and Nahum.[34] Before the ligation of the coronary artery the heart removed lactic acid from the blood, whereas after such ligation lactic acid was added to the blood by the heart. The diminished oxygen supply to the myocardium may account for this increase in lactic acid production and conversely its increase may limit the abnormal metabolism. For the present purpose it is important to bear in mind that oxygen inhalations are effective in relieving the pain of coronary thrombosis in a high percentage of cases and coincidentally other significant advantages are gained.

As the logical and sustained source of energy the diet requires especial attention in myocardial affections. Since glucose is the most readily combustible of foodstuffs, it should be especially maintained in the dietary of such patients. From the precepts of Budingen[9] has arisen a tendency to feed excesses of glucose to patients with myocardial disorders. Allan,[1] for example, advised one-half pound of glucose daily in coronary thrombosis. Master, Jaffe and Dack[54] sounded a reactionary note in advising low caloric diets under these conditions. On an 800 calorie diet (80 gm. carbohydrate, 50 gm. protein and 30 gm. fat) declines of the basal metabolic rate to —20 and —30 per cent were reported. Apparently incidental and more serious hazards have been overlooked by these workers in their desire to attain a fixed end. Experimental proof of the efficacy of glucose is available in the observations of Edmunds and Cooper[17] of the life-saving property of the intravenous injection of 10 per cent glucose solution in the circulatory failure incident to intoxication by diphtheria toxin. The excellent clinical results of Smith, Gibson and Ross[81] from the use of high carbohydrate diets in cardiac failure afford adequate argument in support of this plan of procedure. If the stomach be retentive, it is obviously unnecessary to consider other routes of administration; but where nausea and vomiting preclude the alimentary route, we have for years been giving a 5 per cent glucose solution intravenously in 500 c.c. doses two or three times a day. Admittedly this low concentration of glucose affords a relatively small amount of energy; but its isotonicity obviates the serious danger of the right heart overload that sometimes attends the use of hypertonic glucose solution.

After the acute danger is past the diet should still be arranged to meet the energy requirements of a laboring myocardium. Certainly a balanced ration with adequate carbohydrate is in order. The fluid intake should not exceed 1,500 c.c. and the salt should not be pushed. In fact it is safer to maintain a salt-poor regimen, if there be signs of congestive failure. Overloading of the stomach must be assiduously avoided in view of the symptoms thereto attendant in coronary disease. Five small rather than three average meals should be the rule. Abdominal distension must be avoided or corrected because of the respiratory and circulatory handicaps it imposes. For the first few days little attention need be paid to the state of the bowels. Thereafter it is well to insure a loose or slightly formed stool by the use of mild cathartics. Non-irritant enemata may effect the same end. The serious burden of straining at stool[55] should never be overlooked in this group of patients.

Efforts to improve the blood flow through the coronary system have been rewarded by both experimental and clinical encouragement. In 1925 Smith, Miller and Graber[82] in an experimental study upon rabbits found that perfusions of 1-25,000 caffein sodio-benzoate solution and of 1-25,000 theobromine sodio-salicylate did not influence the cardiac rate, amplitude of contraction or coronary flow. A strength of 1-12,500 of the latter drug reduced the rate of flow with equivocal results upon the cardiac rate and amplitude. Theophyllin and euphyllin in strengths of 1-25,000 increased the coronary flow independent of increase in the rate. Musser[60] reported results from theophyllin ethylenediamin in the after-care of coronary thrombosis only slightly less favorable than those remarked in angina pectoris. Finally the recent experimental observations of Fowler, Hurevitz and Smith[21] placed the peculiar utility of theophyllin ethylenediamin on a sound basis. Conclusive evidence of its action in promoting collateral circulation was adduced from the marked restriction of the area of infarction and scarring in dogs receiving the drug after ligation of the coronary artery as compared with the extent of infarction in control animals that received none. Accordingly theophyllin ethylenediamin should be given immediately after the coronary accident, and if necessary it may be administered intravenously. At the Wisconsin General Hospital it has been our plan to continue its use for four to six months. The dose usually advised is 1½ grains (0.1 gm.) three times a day. Occasionally it has been necessary to interrupt the course of the drug by reason of restlessness, insomnia, or other evidence of cerebral stimulation. On the other hand, a patient of mine has taken 1½ grains twice a day for over two years without a recurrence of his symptoms and without ill effects. It has been our custom to discontinue the theophyllin ethylenediamin for trial periods of rest. A return of adverse symptoms is adequate warning for its renewal.

The immediate support of the heart during and succeeding the accident of coronary occlusion next requires our attention. This demand is much less pressing than was the case before the routine use of oxygen, glucose and theophyllin ethylenediamin. Occasionally the circulatory collapse of the initial period requires heroic measures. If there be venous hypertension with dyspnea, cyanosis, pulmonary edema, venous engorgement and enlargement of the liver, a venesection of 500 c.c. may be life-saving. One patient in our series lived for two years after such an experience. Routine observations of the venous pressure are recommended in this relation and a maintained or rising pressure of over 20 cm. of water in the veins may be taken as an absolute indication for phlebotomy.[19] The rapidly acting stimulants, as caffein sodium benzoate, strophanthin and epinephrin, should find an occasional place in this emergency, but they have commonly failed us. By reason of their remarkable efficacy in angina pectoris, it is perhaps natural that the profession should turn and cling to the use of nitrites in coronary thrombosis. Prodger and Ayman[69] have pointed out the potential danger of nitroglycerin in further lowering the blood pressure and thus favoring coronary thrombosis.

Levine[46] has called attention to the serious threat of ventricular tachycardia in coronary thrombosis. For its control he suggested the availability of quinidine, which was first used by Scott[74] for this condition. Levine[46] has used as much as 1.5 gm. of quinidine sulphate five times a day with success. By reason of its evanescent action doses of 2 grains (0.125 gm.) are recommended at 2 hour intervals through the day and night for thirty-six hours. The individual dose may be increased to 4 grains (0.250 gm.); but a longer interval than two hours will not afford a fair trial of the drug's usefulness. Objection is registered against the routine use of depressant agents such as quinidine in coronary occlusion for prophylaxis against so unusual a complication as ventricular tachycardia. Epinephrine has a clear place in the treatment of heart block and it may operate dramatically at times. For more continued use ephedrine sulphate (0.025 to 0.050 gm. three times a day) or barium chloride (0.030 to 0.120 gm. four times a day) may be useful in the abolition of the episodes of Adams-Stokes' syndrome.

The use of digitalis in coronary thrombosis has been the source of considerable controversy. Gold[25] concluded from animal experimentation that ventricular fibrillation, the most serious hazard of digitalis, occurred no more frequently after coronary obstruction than in control animals. Scarcely was this fear allayed when Gilbert and Fenn[24] found that digitalis decreases the coronary flow in dogs by vaso-constriction. In all probability we should withhold digitalis in coronary occlusion unless there be evidences of decompensation or threatened decompensation. It must not be given routinely.

The antisyphilitic measures of therapy should be deferred, where this etiology exists, for six weeks or two months after a coronary accident to assure adequate repair. Then mercury or bismuth and potassium iodide rather than the arsenicals are employed over a period of six weeks to two months. Thereafter arsenicals may be given cautiously and periods of mixed treatment may be interspersed with the arsenical series.

The diabetic subject with coronary thrombosis presents an interesting problem. Earlier occasion[57] has been taken to point out the dangers of insulin shock and hypoglycemia. Budingen[9] has emphasized the clinical hazards of these circumstances. Turner[86] and others remarked the development of anginal attacks incident to insulin shock. Apparently the profession has taken a most reactionary viewpoint in the matter. There can be no doubt of the need of insulin in such patients and the real precaution that must never be overlooked is the avoidance of insulin shock at all costs.

With the reawakened interest in life will come requests from the patient to resume certain habits. It is interesting that recent observations should have cleared coffee and alcohol of any direct responsibility in coronary disease. There is no apparent reason to interdict the use of such beverages in moderation. Tobacco has a different charge. Lampson[43] has very recently completed a very interesting and convincing study of the vaso-constricting effect of smoking. After smoking and inhaling a cigarette marked vasoconstriction lasting for about 60 minutes was observed in the peripheral vessels. If the subject did not inhale, this vasoconstriction lasted only 15 minutes. Denicotinized cigarettes had less effect than untreated cigarettes. The cigar and pipe induced parallel effects to the cigarette. Hence tobacco in all forms must be forbidden in the patient who has sustained a coronary occlusion.

Finally the patient himself must be a full partner in the conduct of his later convalescent course and in his readjustment to a more or less modified plan of subsequent living. It is rarely wise to take the patient into your complete confidence in the shocking hours or days immediately succeeding the coronary accident. The immediate family or friends will share the confidence of the physician at this time. As the patient begins to extend his interests beyond the sickroom, it is wise to give him some appreciation of the gravity of the situation. The approach must be most tactfully made and only enough of the truth told to insure his complete coöperation. The problem is strictly individual and the physician's insight into the psychology of the patient will ease the path and avoid needless shock. It is well to give him an approximate idea of the protracted period of inactivity that faces him relatively early in the convalescence. The degree of ultimate recovery depends so much upon the completeness of his coöperation that the very idea of a lack of definition of his program may well wreak havoc. The transition to ordinary daily life and activities must of necessity be very gradual in an effort to avoid the retracing of steps. There is no royal road to estimating the degree of functional recovery in the myocardium. It must be a program of trial and error. In certain instances the circulatory capacity may regain its normal level. In others it may strike a plateau far below its preocclusive state. To this group, we would direct your attention in closing. Theoretically (or should we say from a functional standpoint?) life may be extended by a sedentary existence and the avoidance of every semblance of strain or effort. Perhaps by these most rigid measures of protection the individual may eke out a few more months or years than would otherwise be the case. On the other hand, he may by following his natural inclination shorten his life by the same measure. In my judgment he has a perfect right to that decision. "Why ward off death if in the attempt we kill living?"[51] A respected physician of Wisconsin came into my office a little while past for an evaluation of his circulatory reserve. When appraised of the existence of a coronary thrombosis, he remarked that he had suspected the same; but said he, "I have no fear of death, just so the twilight is not too long."

References

1. Allan, G. A.: Diseases of the coronary arteries. Brit. M. J., 2:232, 1928.
2. Barach, A. L.: The therapeutic use of oxygen in heart disease. Ann. Int. Med., 5:428, 1931.
3. Barach, A. L., and Levy, R. L.: Oxygen in the treatment of acute coronary occlusion. Jour. A. M. A., 103:1690, 1934.
4. Barnes, A. R.: Electrocardiogram in myocardial infarction. Arch. Int. Med., 55:457, 1935.
5. Barnes, A. R., and Ball, R. G.: The incidence and situation of myocardial infarction in one thousand consecutive postmortem examinations. Am. J. Med. Sc., 183:215, 1932.
6. Barnes, A. R., and Whitten, M. B.: Study of the R-T interval in myocardial infarction. Am. Heart J., 5:142, 1929.
7. Bellet, S., Gouley, B. A., and McMillan, T. M.: The nourishment of the myocardium through the Thebesian vessels in a heart in which the large coronary arteries and veins were destroyed by the tuberculous myocarditis. Arch. Int. Med., 51:112, 1933.
8. Bickel, G., Mozer, J., and Sciclounof, F.: La sédimentation globulaire dens l'infarctus du myocarde. La signification diagnostique et pronostique. Arch. des Malad. du Coeur, des Vaisseaux et du Sang, 28:73, 1935.
9. Budingen, T.: Ernährungs-und Stoffwechsel-Störungen in Herzen (Kardiodystrophien) beim Di-

abetes Mellitus und beim "Insulinschaden." Zentralbl. f. Herz. u. Gefassk., 17:215, 231, 1925.

10. Burak, M.: Die Bedeutung der Senkungsgeschwindigkeit für die Diagnose des akuten Coronarverschluss. Wien. klin. Wchnschr., 47:327, 1934.
11. Burton, J. A. G., Cowan, J., Kay, J. H., Marshall, A. J., Rennie, J. K., Ramage, J. H., and Teacher, J. H.: Four cases of fibrosis of the myocardium with electrocardiographic and postmortem examinations. Quart. J. Med., 23:293, 1930.
12. Christian, H. A.: Cardiac infarction (coronary thrombosis); an easily diagnosable condition. Am. Heart J., 1:129, 1925.
13. Conner, L. A., and Holt, E.: The subsequent course and prognosis in coronary thrombosis. Am. Heart J., 5:705, 1930.
14. Cooksey, W. B.: Coronary thrombosis follow-up studies with especial reference to prognosis. Jour. A. M. A., 104:2063, 1935.
15. Diamond, M.: Calcification of myocardium in a premature infant. Arch. Path., 14:137, 1932.
16. Dock, G.: Notes on the coronary arteries, Ann Arbor, 1896.
17. Edmunds, C. W., and Cooper, R. G.: Action of cardiac stimulants in circulatory failure due to diphtheria. Jour. A. M. A., 85:1798, 1925.
18. Evans, J. A.: Coronary occlusion with survival. Minn. Med., 13:163, 1930.
19. Eyster, J. A. E., and Middleton, W. S.: Venous pressure as a guide to venesection in congestive heart failure. Am. J. Med. Sc., 174:486, 1927.
20. Feil, H. S., Katz, L. N., Moore, R. A., and Scott, R. W.: The electrocardiographic changes in myocardial ischemia. I. The effects of ligation of the left descending coronary artery with and without occlusion of the inferior vena cava. Am. Heart J., 6:522, 1931.
21. Fowler, W. M., Hurevitz, H. M., and Smith, F. M.: The effect of theophyllin ethylenediamine on experimentally induced cardiac infarction in the dog. Proc. 26th Ann. Meeting, Am. Soc. Clin. Investig., J. Clin. Investig., 13:694, 1934.
22. Fulton, J. T.: Remarks upon the manner of death in coronary thrombosis. Am. Heart J., 1:138, 1925.
23. Galli, G.: Ueber anastomotische Zirkulation des Herzens. Münch. med. Wchnschr., 50, 2:1146, 1903.
24. Gilbert, N. C., and Fenn, G. K.: Effect of digitalis on the coronary flow. Arch. Int. Med., 50: 668, 1932.
25. Gold, H.: Action of digitalis in the presence of coronary obstruction. Arch. Int. Med., 35:482, 1925.
26. Grant, R. T., and Viko, L. E.: Observations on the anatomy of the Thebesian vessels of the heart. Heart, 15:103, 1929.
27. Gross, L.: The blood supply to the heart, New York, 1921.
28. Haldane, J. S.: Symptoms, causes and prevention of anoxemia, and the value of oxygen in its treatment. Lancet, 2:65, 1919.
29. Hamburger, W. W.: Disease of the coronary vessels, angina pectoris, and "acute indigestion." Med. Clin. N. Amer., 9:1261, 1926.
30. Hammer, A.: Ein Fall von thrombotischem Verschlusse einer der Kranzarterien des Herzens. Wien. Med. Wchnschr., 28:97, 1878.
31. Herrick, J. B.: Clinical features of sudden obstruction of the coronary arteries. Jour. A. M. A., 59:2015, 1912.
32. Herrick, J. B.: Acute obstruction of the coronary artery, Northwest Med., 24:593, 1925.
33. Herrick, J. B.: Some unsolved problems connected with acute obstruction of the coronary artery. Am. Heart J., 4:633, 1929.
34. Himrich, H. E., Goldfarb, W., and Nahum, L. H.: Changes of the carbohydrate metabolism of the heart following coronary occlusion. Am. J. Physiol., 109:403, 1934.
35. Hirsch, C., and Spalteholz, W.: Coronararterien and Herzmuskel (Anatomische und experimentelle Untersuchungen). Deutsch. Med. Wchnschr., 20: 790, 1907.
36. Hirschboeck, F. J.: Calcification of the myocardium following coronary occlusion. Am. Heart J., 10:264, 1934.
37. Hudson, C. L., Moritz, A. R., and Wearn, J. T.: The extracardiac anastomoses of the coronary arteries. J. Exp. Med., 56:919, 1932.
38. Jegorow, B.: Die intravitale Diagnose des Myokard-infarktes. Ztschr. f. klin. Med., 106:71, 1927.
39. Katz, L. N.: Mechanism of pain production in angina pectoris. Am. Heart J., 10:322, 1935.
40. Katz, L. N., Feil, H. S., and Scott, R. W.: The electrocardiogram in pericardial effusion. II—Experimental. Am. Heart J., 5;77, 1929.
41. Kissin, M.: Relation of induced anoxemia to the pain of muscular exercise. Proc. Soc. Exp. Biol. and Med., 30:114, 1932.
42. Kountz, W. B., and Gruber, C. M.: Electrocardiographic changes in anoxemia of the heart. Proc. Central Soc. Clin. Research, Nov. 22, 1929, J. Clin. Investig., 8:664, 1930.
43. Lampson, R. S.: A quantitative study of vasoconstriction induced by smoking. Jour. A. M. A., 104: 1963, 1935.
44. Leary, T., and Wearn, J. T.: Two cases of complete occlusion of both coronary orifices. Am. Heart J., 5:412, 1930.
45. Levine, S. A.: Cases of coronary occlusion with recovery. Med. Clin. N. Amer., 8:1719, 1925.
46. Levine, S. A.: Coronary thrombosis, its various clinical features. Baltimore, 1929.
47. Levy, R. L., and Barach, A. L.: The therapeutic use of oxygen in coronary thrombosis. Jour. A. M. A., 94:1363, 1930.
48. Lewis, T.: Observations upon disorders of the heart's action. Heart, 3:279, 1911-1912.
49. Lewis, T., Pickering, G. W., and Rothschild, P.: Observations upon muscular pain in intermittent claudication. Heart, 15:359, 1931.
50. Libman, E.: The importance of blood examination in the recognition of thrombosis of the coronary arteries and its sequelæ. Am. Heart Assoc. Trans., May 26, 1925; Am. Heart J., 1:121, 1925.
51. Longcope, W. T.: Methods and medicine. Bull. J. Hopkins Hosp., Jan., 1932.

52. Luten, D.: Coronary thrombosis of lesser severity. Med. Clin. N. Amer., 11:445, 1927.
53. MacWilliam, J. A., and Webster, W. J.: Sensory phenomena associated with defective blood supply to working muscles. Brit. M. J., 1:51, 1923.
54. Master, A. M., Jaffe, H. L., and Dack, S.: Low basal metabolic rates obtained by low calorie diet in coronary artery disease. Proc. Soc. Exp. Biol., and Med., 32:779, 1935.
55. Meyer, O. O., and Middleton, W. S.: The influence of respiration on venous pressure. J. Clin. Investig., 8:1, 1929.
56. Middleton, W. S.: Coronary Disease. Minn. Med., 10:743, 1927.
57. Middleton, W. S., and Oatway, W. H., Jr.: Insulin shock and the myocardium. Am. J. Med. Sc., 181:39, 1931.
58. Miller, J. L., and Matthews, S. A.: Effect on the heart of experimental obstruction of the left coronary artery. Arch. Int. Med., 3:476, 1909.
59. Moritz, A. R., Hudson, C. L., and Orgain, E. S.: Augmentation of the extracardiac anastomoses of the coronary arteries through pericardial adhesions. J. Exp. Med., 56:927, 1932.
60. Musser, J. H.: Theophyllin ethylenediamin in heart disease associated with pain. Jour. A. M. A., 91:1242, 1928.
61. Oberhelman, H. A., and LeCount, E. R.: Variations in the anastomoses of the coronary arteries and their sequences. Jour. A. M. A., 82:1321, 1924.
62. Obratzow, W. P., and Strachesko, N. C.: Zur Kenntnis der Thrombose der Koronarterien des Herzens. Ztschr. f. klin. Med., 71:116, 1910.
63. Oppenheimer, B. J., and Rothschild, M. A.: The value of the electrocardiogram in the diagnosis and prognosis of myocardial disease. Trans. Assoc. Am. Phys., 39:247, 1924.
64. Pardee, H. E. B.: Heart disease and abnormal electrocardiograms. Am. J. Med. Sc., 169:270, 1925.
65. Pardee, H. E. B.: Complete clinical recovery after thrombosis of a coronary branch. Am. Heart J., 2:442, 1927.
66. Parkinson, J., and Bedford, D. E.: Cardiac infarction and coronary thrombosis. Lancet, 1:4, 1928.
67. Parkinson, J., and Bedford, D. E.: Successive changes in the electro-cardiogram after cardiac infarction (coronary thrombosis). Heart, 14:195, 1927.
68. Porter, W. T.: Further researches on the closure of the coronary arteries. J. Exp. Med., 1:46, 1896.
69. Prodger, S. H., and Ayman, D.: Some harmful effects of nitroglycerine, especially in coronary thrombosis. Am. J. Med. Sc., 184:480, 1932.
70. Rabinowitz, M. A., Shookhoff, C., and Douglas, A. H.: The red cell sedimentation time in coronary occlusion. Am. Heart J., 7:52, 1934.
71. Resnik, W. H.: Observations on the effect of anoxemia on the heart. I—Auricular-ventricular conduction; II—Intraventricular conduction; III—Changes in the auricles, with particular reference to the relationship between anoxemia and auricular fibrillation. J. Clin. Investig., 2:93, 117, 125, 1925.
72. Rizer, R. I.: Oxygen in the treatment of coronary occlusion. Minn. Med., 12:506, 1929.
73. Rothschild, M. A., and Kissin, M.: Anginal syndrome induced by gradual general anoxemia. Proc. Soc. Exp. Biol. and Med., 29:577, 1932.
74. Scott, R. W.: Observations on a case of ventricular tachycardia with retrograde conduction. Heart, 9:297, 1921.
75. Scott, R. W.: Syphilitic aortic insufficiency. Arch. Int. Med., 34:645, 1924.
76. Scott, R. W., and Katz, L. N.: The electrocardiogram in pericardial effusion. I—Clinical. Am. Heart J., 5:68, 1929.
77. Singer, R.: Zur Klinik der Coronar-Thrombose. Wien. klin. Wchnschr., 26:810, 1934.
78. Slater, S. R., and Kornblum, D.: Bilateral coronary occlusion with mitral stenosis. Jour. A. M. A., 102:38, 1934.
79. Smith, F. M.: The ligation of coronary arteries with electrocardiographic study. Arch. Int. Med., 22:8, 1918.
80. Smith, F. M.: Further observations on the T wave of the electrocardiogram of the dog following the ligation of the coronary arteries. Arch. Int. Med., 25:673, 1920.
81. Smith, F. M., Gibson, R. B., and Ross, N. G.: The diet in the treatment of cardiac failure. Jour. A. M. A., 88:1943, 1927.
82. Smith, F. M., Miller, G. H., and Graber, V. C.: The effect of caffein sodio-benzoate, theobromin socio-salicylate, theophyllin and euphyllin on the coronary flow and cardiac action of the rabbit. J. Clin. Investig., 2:157, 1925.
83. Spalteholz, W.: Die Arterien der Herzwand. Leipzig, 1924.
84. Stella, G.: The part played by the Thebesian vessels in the blood supply to the heart. J. Physiol., 73:36, 1931.
85. Thorel, C.: Pathologie des Kreislauforgane. Ergebn. allg. Path. u. path. anat., 9, pt. 1; 673, 1903.
86. Turner, K. B.: Insulin shock as a cause of cardiac pain. Am. Heart J., 5:671, 1930.
87. von Leyden, E.: Ueber die Sclerose der Coronar-Arterien and die davon abhangigen Krankheitszustande. Ztschr. f. klin. Med., 7:459, 1884.
88. Wayne, E. J., and Graybill, A.: Observations on the effect of food, gastric distension, external temperature, and repeated exercise on angina of effort, with a note on angina sine dolore. Clin. Science, 1:287, 1934.
89. Wearn, J. T.: Role of the Thebesian vessels in the circulation of the heart. J. Exp. Med., 47:293, 1928.
90. Wearn, J. T., Mettier, S. R., Klumpp, T. G., and Zschiesche, L. J.: The nature of the vascular communications between the coronary arteries and the chambers of the heart. Am. Heart J., 9:143, 1933.
91. Weigert, C.: Ueber die pathologischen Gerinnungsvorgänge. Arch. f. Path. Anat. u. Phys. u. f. klin. Med., 79:87, 1880.
92. White, P. D.: The prognosis of angina pectoris

and of coronary thrombosis. Jour. A. M. A., 87: 1525, 1926.

93. White, P. D.: Longevity after coronary thrombosis. Jour. A. M. A., 100:233, 1933.
94. White, P. D., and Bland, E. F.: A further report on the prognosis of angina pectoris and of coronary thrombosis. Am. Heart J., 7:1, 1931.
95. Willius, F. A.: Prognosis in heart disease with special reference to coronary disease. Minn. Med., 10:267, 1927.
96. Wollheim, E.: Herzinfarkt und Angina pectoris. Deutsch. Med. Wchnschr., 57:617, 1931.

CORRELATION OF X-RAY HEART SHADOWS WITH CLINICAL AND AUTOPSY FINDINGS*

ALFRED HOFF, M.D.

Saint Paul

THE roentgen ray study of the heart and great vessels has been advanced by a large number of workers, among whom should especially be mentioned Vaquez and Bordet, Herbert Assmann, and F. M. Groedel.

Much of this work has been an effort to demonstrate the changes in the cardiac outline due to disease or congenital defects, and to establish exact methods of measurement.

The size and shape of the normal heart is most difficult to determine because it is affected by height, weight, race, age, the position and contour of the diaphragm and structural deformities of the thorax. In addition, the roentgen rays being divergent rays, distortion of the cardiac silhouette results unless the subject is placed at a seven foot film distance or use is made of the central ray as in orthodiagraphy. Each of these methods gives a fairly accurate estimate of heart size which may be expressed in a percentage value, known as the cardiothoracic index, on the basis of the ratio of the total transverse diameter of the heart to that of the thorax at its widest inside diameter, usually at the costo-diaphragmatic attachments.

Although the cardio-thoracic index correlates the body type and the heart size in an inaccurate manner, it has the clinical advantage of speed and of affording the clinician some numerical conception of smallness or bigness. Unless heart measurements take into consideration body types, they have little significance.

The lesser degrees of hypertrophy are most difficult of accurate demonstration. Lewis says that "great accuracy of measurement is unattainable and, if it were, it would serve no practical purpose."

The position of the diaphragm and the constitutional habitus of the individual especially affect the shadow contour of the normal heart. At full sustained inspiration, the heart of the slender subject will give a fairly straight left border, the so-called mitral configuration. At full sustained expiration, that of the short, stout or obese individual will conform to the aortic type in which the usual concavity of the left border becomes markedly accentuated. In the first instance, it is probable that in a long, narrow chested person, the forces acting upon the heart during the descent of the diaphragm rotate it to the left, thereby increasing the normally prominent conus pulmonalis and straightening out the left border. In the short, stout individual, who usually has a high diaphragm, deep expiration has the opposite effect.

The phase of respiration, however, does not appreciably affect the shadow contour of definitely diseased large hearts because with enlargement there is usually an accompanying change of form. This is seen in valvular defects where frequently the cardiac silhouette alone often permits of a diagnosis of the underlying pathological condition.

Although the cardiac silhouette merely reveals evidence of gross structural change, which is usually impossible of correction, it does aid materially in the establishment of exact diagnosis and accuracy of prognosis which is so essential to the intelligent care of cardiac patients. Especially is this true in the older age group where auricular fibrillation and congestive heart failure by modifying and obscuring the characteristic murmurs of old valve defects cause them to simulate other types of failure which are more common to that group.

---

*Thesis presented before the Minnesota Academy of Medicine, April 10, 1935.

Chronic vavular disease in the young adult or child, where the characteristic murmurs are present, is usually quite easily diagnosed without the assistance of the roentgen ray.

The main purpose of this paper is to illustrate, by the shadow contour of the heart and great vessels alone, the changes occurring as a result of disease and to correlate this picture with the clinical and autopsy findings, where possible, without resorting to fixed cardiac measurements. The cases to be shown consist of those which have been under personal observation for variable periods of time. The films have been taken at medium sustained inspiration in the anteroposterior position at six foot film distance. This permits of easier taken comparable films and of greater film contrast owing to the increased aeration of the lungs.

The left and right anterior oblique positions as a supplement for more detailed information regarding the encroachment of the heart and aorta upon the retrocardial space and mediastinum are very important. However, in practice, these positions are usually done during fluoroscopy, with the result that permanent records for presentation are not available.

The visible contours as shown in the x-ray silhouette of the normal heart and aorta consists on the right side of the outward curve of the right auricle, terminating in that of the ascending aorta, which hardly extends beyond the spinal column. This junction is usually well defined, giving a good estimate of their relative position and length. It is to be noted that the ascending aorta is somewhat longer and in a different vertical plane from that of the right auricle. These differences are markedly changed in certain disease conditions.

The extension of the shadow upwards and to the right is caused by the superior vena cava while that of the aorta is seen to the left as a rather small prominent rounded shadow, called the aortic knob. This represents the beginning of the descending aorta.

The left contour is usually described as consisting of four arcs, the aortic, pulmonary, left auricular and left ventricular. However, general opinion holds that when the pulmonary or left auricular arcs can be definitely identified, the heart is abnormal.

The central part of the heart shadow is produced almost entirely by the right ventricle, with the left ventricle occupying the lower left lateral margin.

In compensated mitral stenosis, there is a definite posterior enlargement of the left auricle. The resultant increased pressure in the lesser circulation causes hypertrophy of the right ventricle. As it enlarges it pushes the right auricle outwardly, making prominent and higher the junction of the right auricle with the ascending aorta. Its enlargement also causes the heart to rotate to the left on its vertical axis, thereby making the conus pulmonalis prominent, straightening out the left border and obscuring the aortic knob. The heart shadow becomes ovoid in form and shows little enlargement. In one-half the cases, the left ventricle participates in this enlargement and the extreme lower left contour, therefore, becomes modified by the amount of the left hypertrophy (Plate 2).

As mitral insufficiency is added, the left ventricle elongates, increasing the extent and straightness of the left border and giving a corresponding increase in the size of the silhouette. The hilus shadows are distinctly widened, the lung field markings increased in intensity and the costo-diaphragmatic angles indistinct (Plates 3 and 4).

Plate 4 is that of a man, aged twenty-three, who had been treated at a sanatorium for pulmonary tuberculosis, where he had been sent on account of cough with blood streaked sputum. The heart signs were typical of mitral stenosis. The shadow contour reveals the extended straight left border with the absence of the aortic knob, the high right auricular junction with the ascending aorta and the marked congestion of the hilus and lungs.

At autopsy, the mitral valve was stenosed to a 4 mm. orifice and the lungs were negative for tuberculosis.

A marked enlargement of the pulmonary bow, indicating a dilatation of the pulmonary artery, has been usually regarded as typical of a patent ductus Botalli. It has also been interpreted as being caused by pulmonary stenosis.

Assmann was one of the first to show that, although pulmonary stenosis may produce dilatation of the pulmonary artery, it is usually accompanied by an interventricular septal defect in which the dilatation is then entirely absent and the heart shadow consequently approaches the normal configuration, with the exception that the aortic knob is placed higher and to the right of the spinal column.

However, a patent ductus arteriosus may be present and produce a contour similar to that in Case 3 and show only a slight increase in the pulmonary arc.

Plate 5 is that of a young woman twenty-one years old, who, from her earliest recollection, had shortness of breath on exertion, associated with palpitation of her heart. There was no apparent cyanosis. Over the precordium, a distinct thrill was palpable, the heart was markedly enlarged to the left and a loud systolic followed by a soft diastolic murmur was heard most intensely at the base. The electrocardiogram was of the inverted type with a normal sinus rhythm. The extended straight left border is modified by a slightly increased prominence of the pulmonary bow and by a definite enlargement of the left ventricle.

At autopsy, all the valves were normal and a patent ductus arteriosus was found.

In this instance, the history, clinical signs and the electrocardiogram pointed the way to the correct diagnosis.

The lesser degrees of increased pulmonary bow prominence may also be seen in conditions in which there is a greatly increased pressure in the lesser circulation, but the shadow heart contour does not conform to the types just illustrated nor the clinical picture to recognized types of heart disease.

Marked cyanosis, associated with intractable asthmatic attacks, polycythemia and clubbing of the fingers, were the presenting symptoms of the patient whose heart outline also shows a moderate dilatation of the pulmonary bow without the characteristic mitral stenotic configuration.

This patient, at autopsy, had a marked hypertrophy of his right ventricle, without evidence

---

Plate 1.—Shadow heart contour. Normal type.

Plate 2.—Mitral heart contour. Ovoid type. M. S., aged eighteen years. *Clinical diagnosis:* Compensated mitral stenosis. *Clinical findings:* History of rheumatic fever. Sharp first apical tone. *Electrocardiogram:* Partial right axis deviation.

Plate 3.—Mitral heart contour. Mrs. H. S., aged fifty years. *Clinical diagnosis:* Mitral stenosis and insufficiency.

Plate 4.—Mitral heart contour. D. McD., aged twenty-three years. *Clinical diagnosis:* Chronic valvular heart disease. Mitral stenosis and insufficiency. Congestive heart failure with slight edema. *Autopsy findings:* (1) Heart weight 528 gms. (2) Old valve defect (mitral stenosis). Mitral leaflets thickened, stenosed and calcified. Orifice 4 mm. x 1:5 cm. Aortic, pulmonary and tricuspid valves normal. (3) Right ventricular hypertrophy. (4) Myocardium, pale and swollen. (5) Left pleura adherent to pericardium. (6) Chronic passive congestion of lungs, liver and spleen.

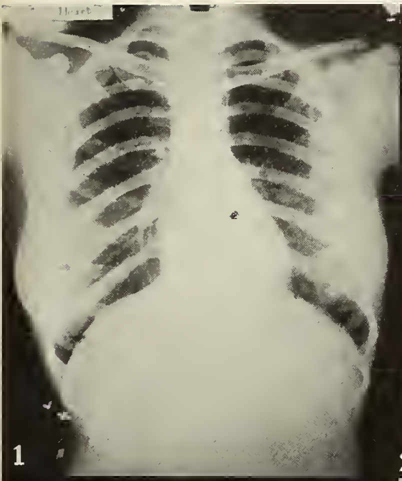
Plate 5.—Mitral heart contour. Miss H. M., aged twenty-four years. *Clinical diagnosis:* Patent ductus arteriosus. Congenital heart disease. *Autopsy findings:* (1) Congenital heart disease. Weight 900 gms. (2) Patent ductus arteriosus, 5 mm. in diameter. (3) No pulmonary stenosis present. (4) Leaflets of aortic valve thickened and fibrous in character.

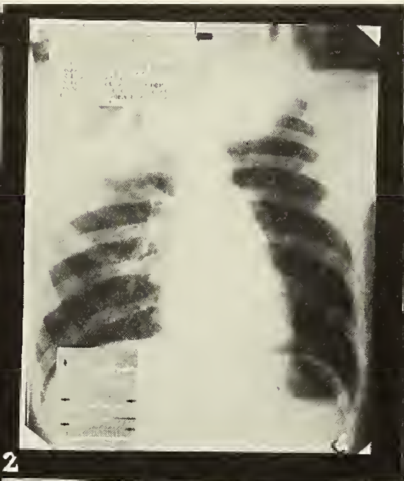
Plate 6.—Pulmonary arc prominence. Ayerza's disease. W. R., aged forty-three years; weight 170 pounds. *Clinical findings:* Severe dyspnea, cough and asthmatic attacks for five years. Congestive heart failure with slight edema. No murmurs. Marked cyanosis. Polycythemia. Hemoglobin 115; red blood cells, 7.5 mil. *Electrocardiogram:* Right axis deviation. *Autopsy findings:* (1) Heart weight 496 gms. (2) Right heart failure. Definite hypertrophy and marked dilatation of right ventricle. (3) Four leaflets, pulmonary valve. (4) Pulmonary congestion and edema. No pulmonary arteriosclerosis. (5) Atelectasis, right. (6) Bilateral hydrothorax.

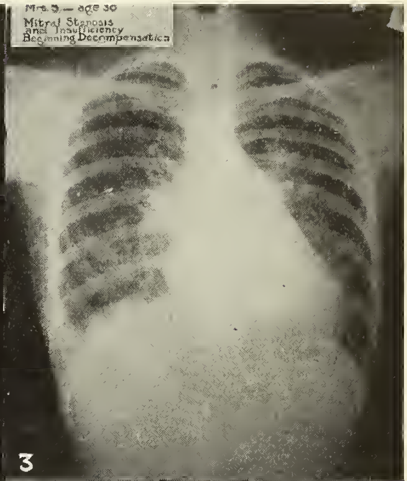
Plate 7.—Mrs. H. S., aged fifty years. *Clinical diagnosis:* Acquired dilatation of pulmonary artery. *Heart findings:* Apex to anterior axillary line. Impulse in third and fifth left interspace. No thrill present. Systolic and diastolic murmurs. Moderate cyanosis. *Pathologic diagnosis:* (1) Old mitral stenosis. (2) Dilatation of pulmonary artery. (3) Hypertrophy and dilatation of heart. (4) Cirrhosis of liver. (5) Chronic passive congestion of liver and spleen. (6) Cloudy swelling of heart and kidneys. *Mitral valve:* Definite stenosis with fibrosis and calcification. Orifice, 1 cm. in diameter. Aortic, pulmonary and tricuspid leaflets normal. Pulmonary artery 8 cm. in diameter at its base and 12 cm. in its greatest width just proximal to bifurcation.

Plate 8.—Aortic type heart contour. C. E. K., aged forty years. *Clinical diagnosis:* Chronic valvular heart disease—rheumatic. Aortic regurgitation, compensated. *Electrocardiogram:* Left axis deviation. Normal T waves L1 and L2.

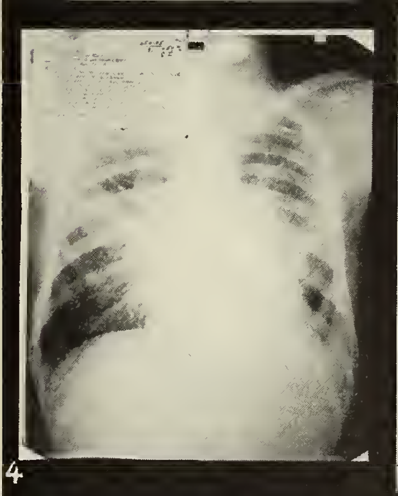
Plate 8A.—Aortic type heart contour. A. H., aged thirty-nine; weight, 150 pounds. *Clinical findings:* Congestive heart failure. No edema. Rheumatic fever at twenty-nine years. Chancre at nineteen years. Usual signs of aortic regurgitation and insufficiency. Cardiac index 69 per cent. Sudden death *Autopsy findings:* (1) Heart weight, 1,000 gms. (2) Aortic valve defect. (3) Hypertrophy and dilatation of heart. (4) No syphilis found. (5) Chronic passive congestion of lungs, liver and kidneys.

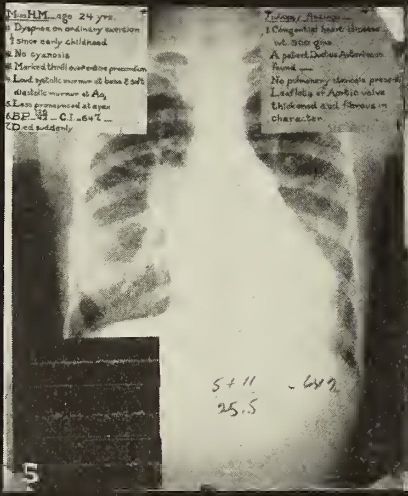

1


2


Mrs. D. — age 30
Mitral Stenosis
and Insufficiency
Beginning Decompensation

3

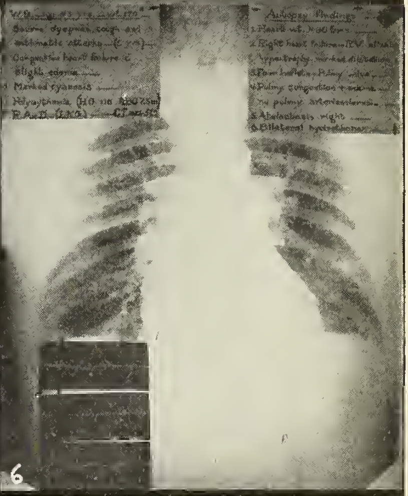

4


Miss H.M. — age 24 yrs.
1. Dyspnea on ordinary exertion
since early childhood
2. No cyanosis
3. Marked thrill over entire precordium
4. Loud systolic murmur at base & soft
diastolic murmur at A_2
5. Less pronounced at apex
6. B.P. 120/[illegible] — C.I. 64% —
7. Died suddenly

Autopsy findings —
1. Congenital heart disease
wt. 500 gms.
A patent Ductus Arteriosus
found —
No pulmonary stenosis present
Leaflets of Aortic valve
thickened and fibrous in
character.

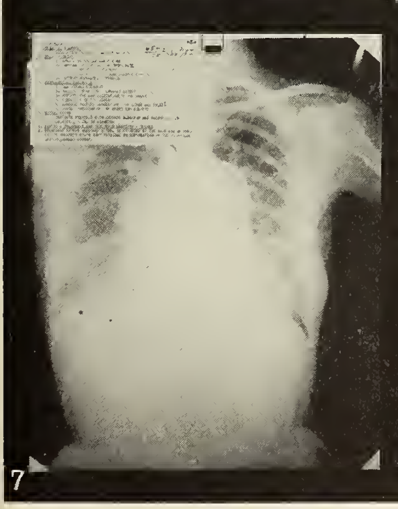
5+11 .64%
25.5

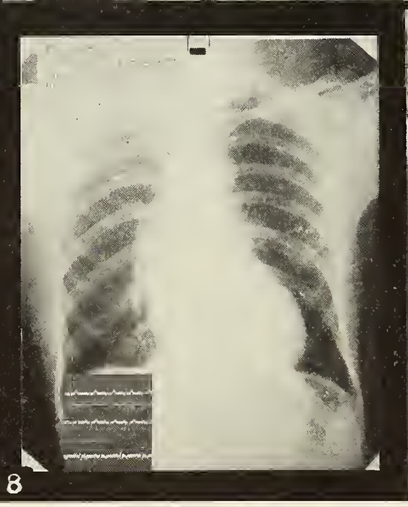
5

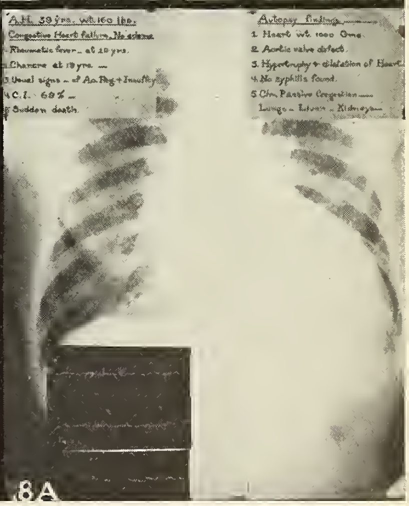

W.P. — [illegible] yrs. [illegible]
Severe dyspnea, cough and
asthmatic attacks — ([illegible] yrs.) —
Congestive heart failure c̄
slight edema —
Marked cyanosis —
Polycythemia (HB [illegible] RBC 7.5m)
R.A.D. (EKG) — C.I. [illegible]

Autopsy findings —
1. Heart wt. [illegible] Gms —
2. Right heart failure — R.V. [illegible]
hypertrophy, marked dilatation
3. [illegible] — Pulmy valve —
4. Pulmy congestion + edema —
no pulmy arteriosclerosis —
5. Atelectasis right —
6. Bilateral hydrothorax —

6


7


8


A.H. 59 yrs. wt. 160 lbs.
Congestive Heart failure. No edema
1. Rheumatic fever — at 10 yrs.
2. Chancre at 19 yrs. —
3. Usual signs — of Ao. Reg + Insuffcy
4. C.I. 68% —
5. Sudden death.

Autopsy findings —
1. Heart wt. 1000 Gms.
2. Aortic valve defect.
3. Hypertrophy + dilatation of Heart.
4. No syphilis found.
5. Chr. Passive Congestion —
Lungs — Liver — Kidneys —

8A

Plates 1-8A
For description see legends on opposite page.

of pulmonary arteriosclerosis or findings usually evident in bronchial asthma (Plate 6).

A marked dilatation of this arc may be acquired and caused by a mitral stenosis. This was the condition found at autopsy in another patient (Plate 7). She was a cyanotic woman, aged fifty, with a heart markedly enlarged to the left, a palpable impulse in the third left interspace, and loud basal systolic and diastolic murmurs, but without a palpable thrill. Auricular fibrillation was present and she showed a congestive heart failure with moderate edema. No polycythemia was present. The mitral valve was calcified and stenosed to a one centimeter diameter, with a marked dilatation of the pulmonary artery and a slight thickening of the pulmonary leaflets.

Aortic configuration results when the left ventricle becomes hypertrophied through increased work by reason of aortic regurgitation or a hypertension.

The enlargement blunts the apex and markedly increases the concavity of the left border but causes little change in the right auricle or the supra-cardiac shadow unless abnormal aortic changes are also present.

In rheumatic or syphilitic aortic regurgitation, the left ventricle becomes greatly enlarged (Plates 8 and 8 *A*).

In the older age group, aortic valve involvement is not infrequently combined with the mitral as a double valve stenosis or with the mitral and tricuspid as a triple valve stenosis and insufficiency.

In combined valvular disease, when it affects the mitral, aortic and tricuspid valves causing triple valve stenosis and insufficiency, the enlarged heart maintains a decidedly mitral stenotic configuration (Plate 9), which persists when an adherent visceral pericarditis is added (Plate 10 and 10 *A*), while if mitral stenosis is combined with aortic stenosis (Plate 11), or with hyper-

---

Plate 9.—Mitral heart contour. Triple valve stenosis and insufficiency. Mrs. O., aged thirty-six years. *Clinical diagnosis:* Combined valvular disease. Congestive heart failure with considerable edema. *Autopsy findings:* (1) Heart weight, 445 gms. (2) Mitral leaflets markedly sealed together, thickened and calcified. Orifice, 1 cm. in diameter. (3) Tricuspid leaflets sealed together and slightly thickened. (4) Aortic leaflets sealed together at the commissures and thickened. (5) Pulmonary leaflets normal. (6) Hypertrophy of left ventricle. Slight hypertrophy of right ventricle.

Plate 10.—Mitral type contour. Triple valve stenosis and insufficiency. Mrs. W. H., aged thirty years. *Clinical findings:* Rheumatic fever—four attacks from eleven to twenty-five years. Four years in hospital with congestive heart failure and marked, constantly re-accumulating ascites and moderate edema. Blood pressure, 120/50. Cardiac index, 60 per cent. Palpable precordial systolic thrill. Systolic and diastolic murmurs heard at aortic area and apex. *P. R.* interval, 0.28 seconds.

Plate 10A.—Mitral type contour. Triple valve stenosis and insufficiency. Terminal stage—four years later. Mrs. W. H., aged thirty-four years. *Clinical diagnosis:* Congestive heart failure with marked edema and ascites. Auricular flutter with regular ventricular response. *Autopsy findings:* (1) Mitral, aortic and tricuspid stenosis. (2) Adherent visceral pericardium. (3) Cirrhosis of liver. (4) Hyloserositis of spleen and liver. (5) Ascites.

Plate 11.—Aortic type heart contour. Mrs. S., aged fifty years; weight, 295 pounds. *Clinical findings:* Congestive heart failure with massive edema. No rheumatic history. Blood Wassermann reaction 4 plus. Blood pressure 160/90 to 110/60. Basal metabolic rate plus 19. Cardiac index, 60 per cent. Harsh systolic murmur at aortic area, second tone muffled and inindistinct. Harsh systolic murmur at apex. No palpable thrill. Auricular fibrillation. *Autopsy findings:* (1) Heart weight, 740 gms. Body weight, 280 pounds (estimate). (2) Calcified aortic leaflets with definite stenosis of orifice. (3) Mitral valve stenosis. (4) Hypertrophy and dilatation of heart. (5) General anasarca. (6) No syphilis found.

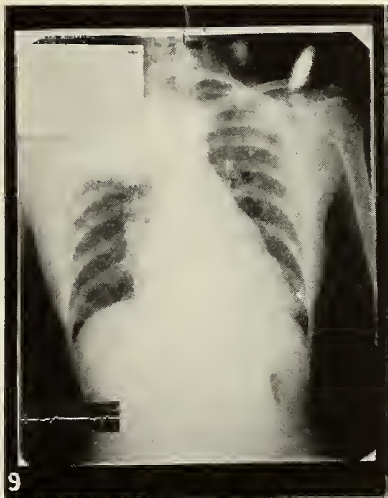
Plate 12.—Aortic type heart contour. Mitral stenosis and hypertension. Mrs. W. J., aged sixty-four years. *Clinical findings:* Congestive heart failure with slight edema. Angina of effort. Rheumatic fever thirty years ago. Auricular fibrillation. No heart murmurs. Blood pressure, 240/130. Cardiac index, 63 per cent. *Autopsy findings:* (1) Heart weight, 606 gms. Body weight, 180 pounds. (2) Mitral stenosis. (3) Coronary arteries patent. (5) Kidneys grossly negative. (5) Cerebral malacia.

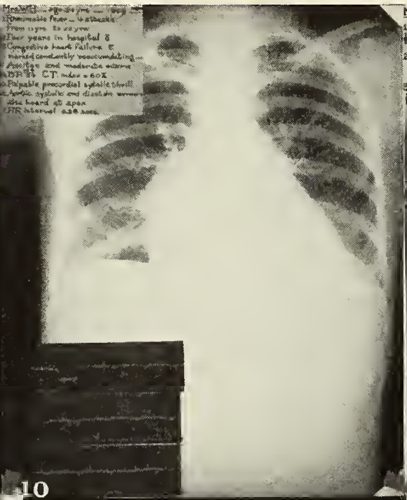
Plate 13.—Mitral type heart contour. Mitral stenosis and insufficiency with slight aortic and tricuspid involvement. Kay J., aged twenty-four years: weight, 120 pounds. *Clinical findings:* Dyspnea on moderate exertion. No rheumatic history. Frequent tonsillitis. Blood pressure, 110/80. Congestive heart failure. Palpable thrill with presystolic and systolic murmurs. No diastolic murmurs. Heart to left of anterior axillary line. *Autopsy findings:* (1) Old valve defect. Mitral markedly adherent. Aortic slightly adherent. Tricuspid slightly thickened. Pulmonary normal. (2) Passive congestion of lungs and liver. (3) Edema and ascites.

Plate 14.—Pericarditis with effusion (early). Rev. W., aged thirty-nine years. *Clinical diagnosis:* Pericarditis with effusion (early). *Autopsy findings:* (See plate 15.)

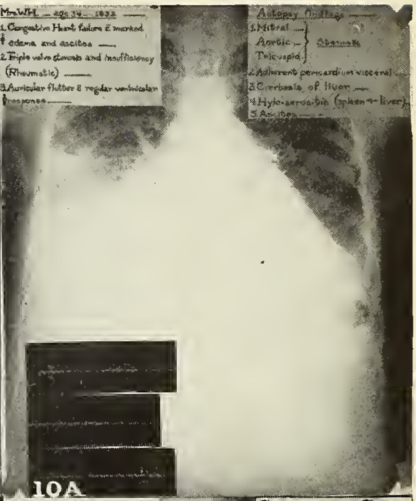
Plate 15.—Pericarditis with effusion. Rev. W., two weeks later. *Clinical diagnosis:* Pericarditis with effusion (early). *Autopsy findings* (six months later): (1) Tuberculous pericarditis. (2) Old tuberculosis of the hilus lymph nodes. (3) Right hydrothorax. (4) Miliary tuberculosis of left lung.

Plate 16.—Aortic type heart contour. F. W. H., aged seventy-five years. *Clinical diagnosis:* Hypertensive heart disease. Coronary sclerosis. Right bundle branch block. No murmurs.

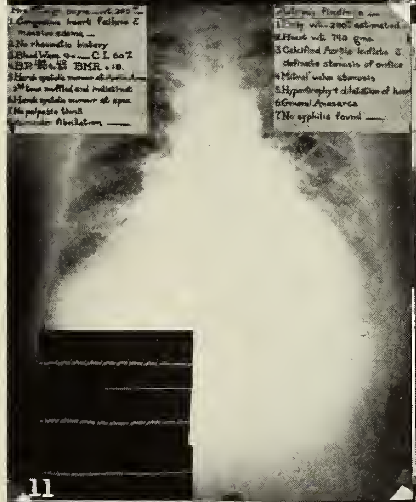

9


10

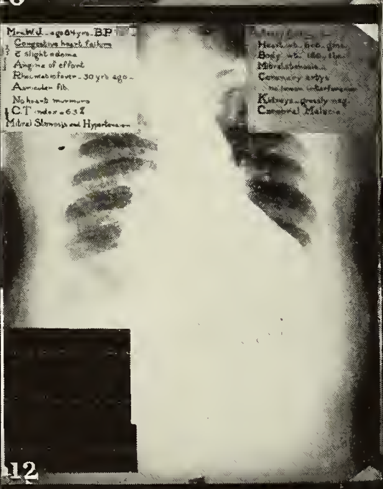
Rheumatic fever
Congestive heart failure
Ascites and moderate edema
C.T. index = 60%
Palpable precordial systolic thrill
Aortic systolic and diastolic murmurs
also heard at apex


10A

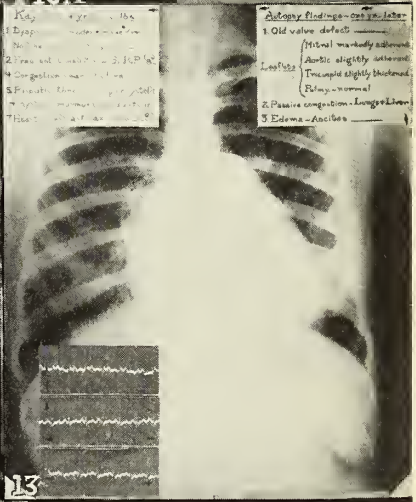
Mrs W.H.
1. Congestive Heart failure c̄ marked edema and ascites
2. Triple valve stenosis and insufficiency (Rheumatic)
3. Auricular flutter c̄ regular ventricular response
Autopsy findings
1. Mitral
Aortic
Tricuspid
Stenosis
2. Adherent pericardium visceral
3. Cirrhosis of liver
4. Hyalo-serositis (spleen + liver)
5. Ascites


11

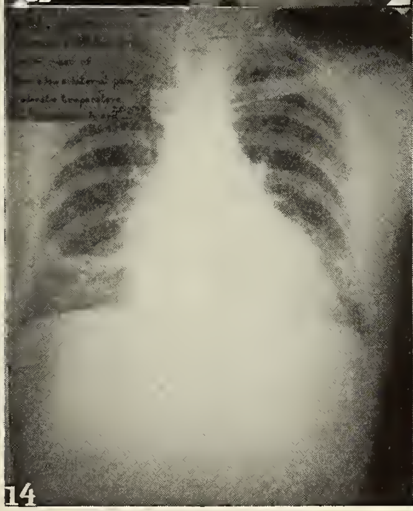
1. Congestive heart failure c̄ massive edema
2. No rheumatic history
3. Blood Wass. 4+
C.T. 60%
4. B.P.
BMR +18
5. Harsh systolic murmur at Aortic Area
6. 2nd tone muffled and indistinct
Harsh systolic murmur at apex
No palpable thrill
Auricular fibrillation
Autopsy findings
1. Body wt. 280 estimated
2. Heart wt. 740 gms.
3. Calcified Aortic leaflets c̄ definite stenosis of orifice
4. Mitral valve stenosis
5. Hypertrophy + dilatation of heart
6. General Anasarca
7. No syphilis found

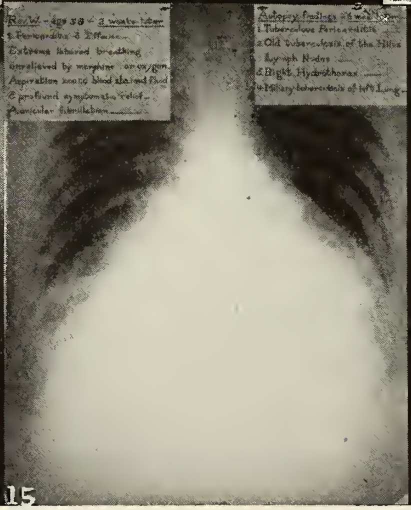

12

Mrs W.J. age 84 yrs. B.P.
Congestive heart failure
c̄ slight edema
Angina of effort
Rheumatic fever - 30 yrs ago
Auricular fib.
No heart murmurs
C.T. index = 63%
Mitral Stenosis and Hypertension
Kidneys - grossly neg.
Cerebral Malacia

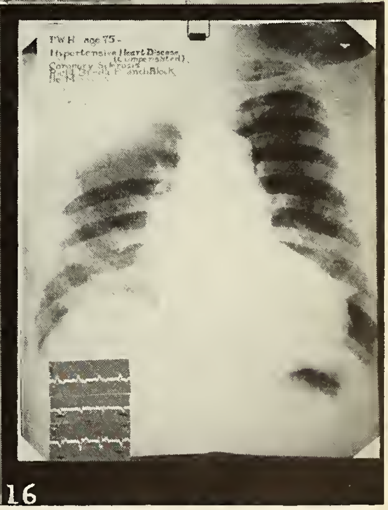

13

Autopsy findings - one yr. later
1. Old valve defect
Leaflets
Mitral markedly adherent
Aortic slightly adherent
Tricuspid slightly thickened
Pulmo. - normal
2. Passive congestion - Lungs + Liver
3. Edema - Ascites


14


15

Rev W. - age 38 - 3 weeks later
1. Pericarditis c̄ Effusion
Extreme labored breathing
unrelieved by morphine or oxygen
Aspiration bloody blood stained fluid
c̄ profound symptomatic relief
Auricular fibrillation
Autopsy findings
1. Tuberculous Pericarditis
2. Old tuberculosis of the Hilus Lymph Nodes
3. Right Hydrothorax
4. Miliary tuberculosis of left Lung


16

F.W.R. age 75
Hypertensive Heart Disease (compensated)
Coronary Sclerosis
Right Bundle Branch Block

PLATES 9-16
For description see legends on opposite page.

tension (Plate 12), the heart conforms usually to the aortic type. However, a slight aortic stenosis may coexist with a marked mitral stenosis and not influence the marked mitral outline (Plate 13). That is, the preponderant lesion determines the type of contour, but may not affect the axis deviation in the electrocardiogram.

Clinically, pericarditis with effusion of small or large degree is frequently unsuspected and unrecognized. It may also exist without much added discomfort to the patient. However, such is not always the case and upon its prompt recognition and relief will depend the transformation of a patient from the depths of unrelievable misery to a condition of relative comfort.

Plate 14 is that of a man, aged thirty-four, who, two weeks previously, after exposure, was seized with a persistently severe low substernal and epigastric pain associated with a temperature of 100 degrees. He was unable to lie down on account of this increasing the severity of his pain. Besides moderate dyspnea and cyanosis, he showed an impairment of resonance at the right base with moist râles bilaterally, a distinct enlargement of his heart to the left and a full, tense, tender abdomen. During the next two weeks, his respiration became so labored that suffocation seemed imminent. He was unrelieved by morphine or oxygen. The cardiac dullness had increased to the left, auricular fibrillation and evidences of consolidation were present at the left base with moist râles bilaterally (Plate 15).

When the two films are compared, it is obvious that only a pericardial effusion could cause, in two weeks, such a decided change in the cardiac outline. Aspiration of 1,000 c.c. of blood-tinged fluid from his pericardium gave him almost immediate symptomatic relief. Repeated aspirations during the following six months of his life kept him in relative comfort.

Autopsy revealed tuberculous pericarditis.

Hypertensive and arteriosclerotic heart disease are the outstanding types found in middle and later life and are the main contributors to the high mortality from cardiac disease.

The helpfulness of the x-ray in these types is limited to the recognition of bigness or smallness of an aortic shadow contour. Evidence of pulmonary congestion may assist in determining the presence of early congestive heart failure.

A very large aortic type heart, with cardio-

Plate 17.—Arteriosclerotic heart disease. Mr. R., aged sixty-eight years. *Clinical findings:* Coronary sclerosis. Angina pectoris. Arteriosclerotic aorta. Small heart. Sudden death due to coronary occlusion. Autopsy not performed.

Plate 18.—Aortic type shadow heart contour. J. G., aged thirty-four years, weight 250 pounds. *Autopsy findings:* (1) Hypertension heart. Weight, 753 gms. (2) Bilateral congestion of lungs. (3) Acute congestion of liver. (4) Splenomegaly.

Plate 19.—Dilatation of ascending aorta. C. W. C., aged forty-eight years. *Clinical diagnosis:* Syphilitic aortitis. *Clinical findings:* (1) Substernal oppression. (2) Blood Wassermann reaction 4 plus. (3) Systolic murmur at base. (4) No diastolic murmur. (5) Normal electrocardiogram.

Plate 20.—Aneurysm of ascending aorta. L. L. (colored), aged forty-five years. *Clinical findings:* Severe substernal oppression with nocturnal attacks of suffocation. Cough severe, with expectoration. No edema. Dyspnea on moderate exertion. (All six months' duration.) Blood pressure, 179/105. Urine albumin 2 plus, casts. Blood Wassermann reaction 4 plus. No diastolic murmur. P2—Ao2. Soft apical systolic murmur. *Electrocardiogram:* T wave minus in L1 and L2. Termination six months later from congestive heart failure with massive edema. Autopsy findings: (1) Saccular aneurysm, ascending aorta. (2) No valvular involvement. (3) Coronary arteries patent. (4) Hypertrophy and dilatation of heart. (5) Hypertension heart. (6) Arteriosclerosis of kidneys.

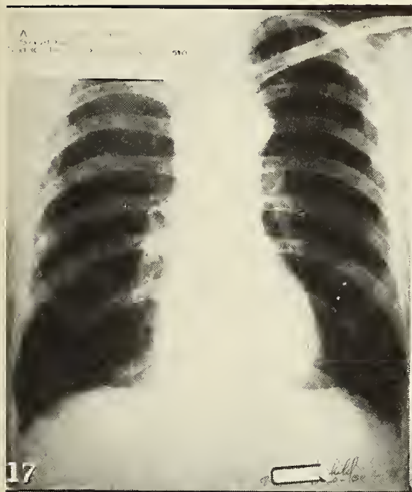
Plate 21.—Diffuse dilatation of thoracic aorta, simulating aneurysm. Mrs. D. N. S., aged sixty years. *Clinical findings:* Blood pressure, 180/100. Congestive heart failure with definite edema. Systolic and diastolic murmurs (precordial). Spinal Wassermann reaction, 4 plus. Blood Wassermann reaction negative. Pupils fixed. K. J. absent. Died suddenly, after copious black stools. *Autopsy findings:* Estimated weight, 140 pounds. (1) Senile ectasia of the aorta. (2) Hypertension heart. Weight, 550 gms. (3) Gastric ulcer with hemorrhage.

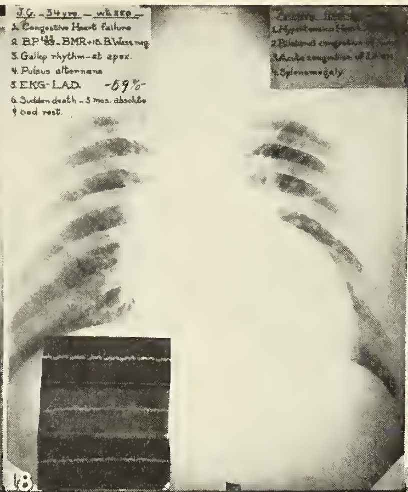
Plate 22.—Dilatation of ascending aorta. Syphilitic aortitis. L. W. C., aged fifty years. *Clinical findings:* Blood pressure 170/90. No heart murmurs. Distant heart sounds. Moderate enlargement. *Pathologic diagnosis:* (1) Syphilitic aortitis. (2) Cardiac hypertrophy. (3) Coronary orifice stenosis. (4) Left coronary trunk occlusion. (5) Chronic passive congestion of spleen and kidney. (6) Acute passive congestion of liver.

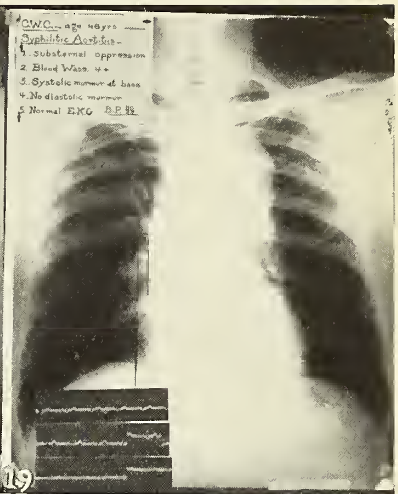
Plate 22A.—Left anterior oblique position. Syphilitic aortitis. Same case as Plate 22.

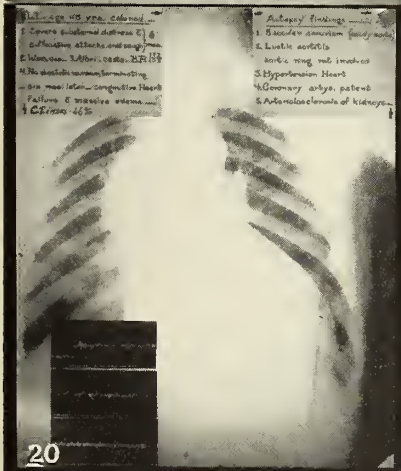
Plate 23.—Atherosclerotic dilatation of aortic arch. M. J. H., aged sixty-two years (1926). *Clinical findings:* No cardiac symptoms. Blood pressure, 160/100 (1922). Blood Wassermann reaction negative. Blood pressure, 220/120 (1931). Hemiparesis (transient). *Electrocardiogram:* Normal.

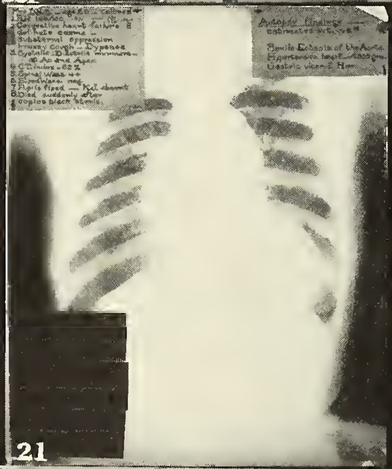
Plate 24.—Atherosclerotic dilatation of aortic arch. M. J. H., aged seventy-one years (nine years later—1935). *Clinical findings:* No cardiac symptoms. Blood pressure, 170/110. Blood Wassermann reaction negative. *Electrocardiogram:* Coronary sclerosis.

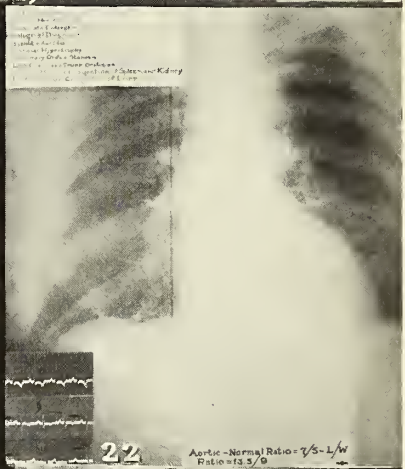

17


J.G. – 34 yrs. – white –
1. Congestive Heart failure
2. B.P. – BMR +10. B.Wass neg
3. Gallop rhythm – at apex.
4. Pulsus alternans
5. EKG – LAD. -59%-
6. Sudden death – 3 mos. absolute bed rest.
1. Hypertension Heart
4. Splenomegaly
18

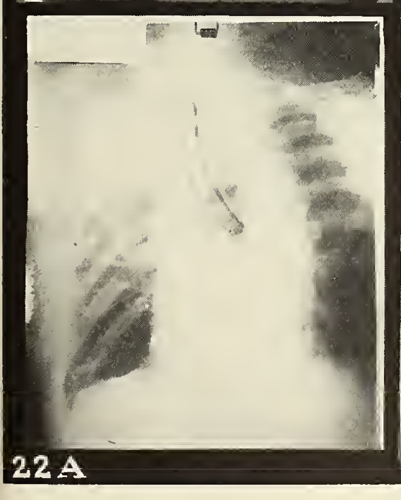

C.W.C. – age 46 yrs
Syphilitic Aortitis –
1. Substernal oppression
2. Blood Wass. 4+
3. Systolic murmur at base
4. No diastolic murmur
5. Normal EKG B.P.
19

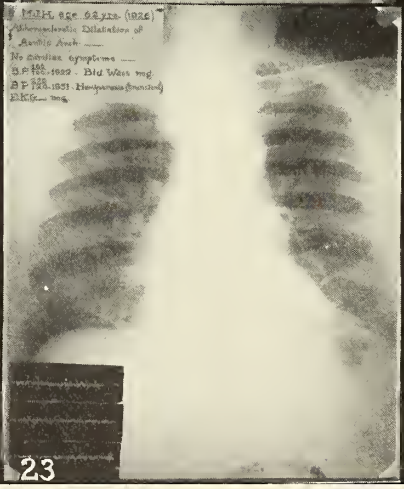

age 45 yrs. colored
Autopsy findings
2. Luetic aortitis
aortic ring not involved
3. Hypertension Heart
4. Coronary artys. patent
5. Arteriolosclerosis of kidneys
Failure c massive edema
C.T. index 66%
20

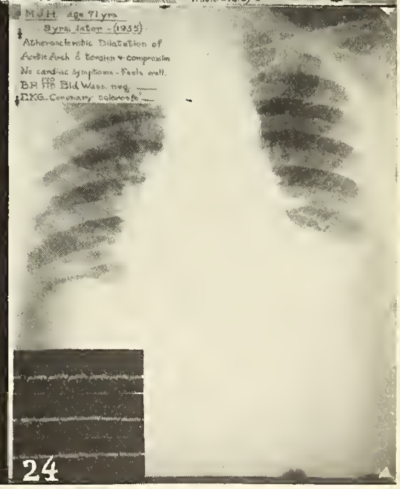

2. Congestive heart failure
Substernal oppression
brassy cough – Dyspnea
3. Systolic murmurs
4. C.T. index 62%
5. Spinal Wass ++
7. Pupils fixed
8. Died suddenly after copious black stools.
Autopsy findings
Senile Ectasia of the Aorta
Hypertensive heart
21


22

Aortic-Normal Ratio = 7/5 – L/W Ratio = 13.5/9


22 A


M.J.H. age 62 yrs. (1926)
Atherosclerotic Dilatation of Aortic Arch
No cardiac symptoms
B.P. 1922 – Bld Wass neg
B.P. 1931 – Hemiparesis (transient)
EKG – neg.
23


M.J.H. age 71 yrs
9 yrs. later – (1935)
Atherosclerotic Dilatation of Aortic Arch c torsion + compression
No cardiac symptoms – Feels well.
B.P. Bld Wass. neg
EKG – Coronary sclerosis
24

PLATES 17-24
For description see legends on opposite page.

graphic evidence of definite myocardial damage, may, nevertheless, be functionally adequate to carry on, while a small arteriosclerotic type of heart, following unusual exertion, may undergo sudden and unexpected dissolution.

Four years ago, I saw a man seventy-five years old, who, after a cocktail and a hearty meal, complained of severe epigastric distress, associated with nausea and vomiting. His face was pale and his skin moist and clammy.

His pulse was of low tension, but not fast. On examination, he had a heart markedly enlarged to the left, with good tones, and a blood pressure of 158/90. The heart was boot shaped with a cardio-thoracic index of 60 per cent. His electrocardiogram showed a right bundle branch block. The next morning he felt perfectly well. He is now seventy-nine years old and during the past four years he has never been incapacitated. He has led a very active life for a man of his age, averaging about three nine hole games of golf weekly throughout the year (Plate 16).

A conclusion based upon the x-ray findings and the electrocardiogram, without due regard to the history of lack of pain, and his prompt recovery, would have led one sadly astray and placed unnecessary restrictions upon his activity.

About this time, another man, sixty-eight years old, who had always led a vigorous, active life, exposed himself to an unusual amount of exertion. He was suddenly seized with a severe uninterrupted substernal pain, which extended into his left arm and little finger. He obtained medical relief and upon his return to the city developed angina on effort. Three weeks later, while resting in a hospital and symptom-free, he died, suddenly, in an agonizing attack of substernal pain, the result of a coronary occlusion.

His heart silhouette (Plate 17) shows merely a small heart with a long aorta such as is frequently seen in arteriosclerosis, while in the electrocardiogram taken a month after his first attack of pain, signs of coronary sclerosis were evident.

Sudden death may also occur in a large heart in which the electrocardiogram gives no evidence of myocardial damage, the x-ray only a suggestion of venous congestion and the postmortem examination no convincing explanation.

This was the case in an obese man, thirty-four years old, who entered the hospital on account of paroxysmal attacks of nocturnal dyspnea, with no past history of hypertension or of a heart affliction and who, a short time previously, had passed a medical examination as fit for heavy work.

The film shows an aortic type silhouette of a markedly enlarged heart involving, especially, the left ventricle, with a cardio-thoracic index of 60 per cent, a clear diaphragm, and a very moderate increase in the lung markings, suggestive of a venous congestion (Plate 18).

This man weighed 250 pounds and, as is so often the case in thick chested, huge individuals, where even extensive enlargement of the heart may be overlooked by palpation and percussion, the roentgen ray proved itself to be most helpful.

His electrocardiogram was not significant. His blood pressure was 130/85, basal metabolic rate plus 16 and his blood Wassermann negative. One arterio-venous constriction was seen in the fundus of his left eye. Throughout his hospital stay of three months, he was comfortable, lying flat in bed, without edema or dyspnea at rest, but he had a persistent gallop rhythm at the apex of his heart and a pulsus alternans, both of which told the story of the seriousness of his heart condition, so that his sudden death was not unexpected.

It is obvious that neither heart size nor the findings in the electrocardiogram can measure heart function. This must be determined by the entire clinical picture and interpreted in the light of clinical experience.

The aging process, with its attendant loss of vessel elasticity, affects the aorta by gradually increasing its length and width. Its size, shape and position will be altered, therefore, according to the adaptation needed to adjust itself to the restrictions of its thoracic cage. This adaptation will be easier of accomplishment in the tall, slender individual, resulting in a long ascending aorta without significant widening.

In the short or thick-set person, where what constitutes a normal aortic arch is often difficult of determination, the addition of the factors of compression and torsion must receive consideration in the estimation of the presence of dilatation. Usually, however, when proper emphasis is given to age, body type, clinical symptoms and findings, lues, often unsuspected, is suggested by signs indicating increased width or dilatation of the ascending aorta. In a considerable number of cases, lues exists without physical signs of aortic insufficiency or significant electrocardiographic abnormalities. A negative blood Wassermann reaction does not remove it as a possible cause.

Juster and Pardee, in a study of fifty cases of luetic aortitis, found the blood Wassermann negative in 14 per cent, while combined tests on the blood and spinal fluid reduced this percentage to 10 per cent of the total cases. Abnormalities of the T wave in the electrocardiogram occurred in 85 per cent of those with aortic insufficiency and in 38 per cent of those without this lesion.

As the ascending aorta widens and progresses to dilatation, a vertical tangential line passing through its right margin approaches a similar one through that of the right auricle, so that it may coincide or even override, thereby disturbing or reversing their usual relationship. As the aorta also lengthens, the point of junction of the ascending aorta and the right auricle becomes gradually lowered and their normal relation lengths is altered, the right contour of the heart shadow becoming dominated by that of the ascending aorta.

The heart shows no appreciable enlargement unless factors increasing the work of the left ventricle, such as aortic insufficiency or hypertension, are also present.

This dilatation is illustrated in Plate 19, which is that of a man forty-five years old, whose symptoms were epigastric distress and regurgitation of mucus. His gastro-intestinal tract was normal but the fluoroscopic screen revealed a diffusely dilated aortic arch, which, in view of his age, suggested syphilis. His heart revealed a soft basal systolic murmur, his blood pressure was low, his blood Wassermann reaction 4 plus and the electrocardiogram was normal. He obtained considerable relief after specific medication and reduction in his physical activities.

In the case of aneurysm, every part of the aortic arch is affected by the increased width (Thoma's law).

The oblique positions are very helpful in the x-ray examination and in the differentiation of aortitis from other mediastinal tumors.

In the case illustrated, the diagnosis of aortic aneurysm was clinically obvious, the x-ray confirmatory, and the autopsy conclusive (Plate 20). Hypertension and arteriosclerosis of the kidneys were the causative factors in the severe grade of cardiac hypertrophy observed.

However, artherosclerotic dilatation of the aortic arch in the presence of hypertension may give an identical picture with that of a luetic aorta, and be of such an extent as to suggest aneurysmal dilatation. Rarely, the associated clinical symptoms and findings are of such a confirmatory character as to make a differential diagnosis impossible.

The sypmptoms, clinical and roentgen ray findings, as indicated in Plate 21, of a colored woman, aged sixty, who died suddenly of a gastric hemorrhage, would surely justify a diagnosis of luetic aortitis, with the possibility of aneurysmal dilatation, yet the postmortem examination revealed a hypertension heart and senile ectasia of the aorta.

The futility of attempting a differential diagnosis in the presence of hypertension between atherosclerotic and luetic aortic dilatation, in fifth or sixth decade, by the roentgen ray contour without giving adequate consideration to the clinical history, findings and progress may be illustrated by the cases shown in Plates 22, 23, and 24.

Plates 22 and 23 represent, respectively, the dilated aortic arch of a luetic aortitis with hypertension in a man fifty years old and that of an atherosclerotic dilatation with hypertension in a man sixty-one years old. There is considerable similarity between the two and a diagnosis from the shadow contour alone is obviously impossible, even though there is a marked difference in the form of the aortic knob and descending aorta. Some writers have stressed this difference as of diagnostic significance, maintaining that a sharply defined rounded contour of the aortic knob is more characteristic of atherosclerosis, while that of one poorly defined, more of syphilis. This is predicated upon the supposed greater calcium content of the former.

The first patient was observed over a period of eight years. His presenting symptoms were those of a moderately severe diabetes mellitus, with a forty pound weight loss, and nocturnal attacks of severe dyspnea. His blood Wassermann reaction was negative and his blood pressure 170/90. His heart was slightly enlarged but no murmurs were heard.

On account of the diffuse dilatation of his aortic arch and the association of this finding with heart symptoms and a glycosuria, the possibility of syphilis was considered.

A tentative diagnosis of luetic aortitis, supravalvular type, was made and the patient was given specific treatment with the result that, after two months, he returned to work and continued doing so for a period of eight years, entirely sugar-free unless he ate sugar. During this period, there were several interesting developments.

After his first course of specific treatment, his blood Wassermann became positive and remained fixed thereafter.

His wife developed tabes dorsalis, and had a positive blood Wassermann reaction.

After seven years of observation, soft systolic and diastolic murmurs could be heard at the base of his heart. With this change in physical signs, he gradually developed congestive heart failure and died suddenly. An electrocardiogram made late in the course of the disease shows a left axis deviation with inverted T waves in the first and second leads.

At autopsy, the heart weighed 635 grams. A luetic aortitis involving the commissures and obscuring the orifice of the right coronary artery was present. The left coronary trunk showed a marked intimal thickening with a 75 per cent occlusion. There were white patches of fibrosis throughout a moderately hypertrophied left ventricle. Microscopic changes in the pancreas could not be demonstrated.

The second patient with hypertension showing a diffuse aortic dilatation is still alive and well at the age of seventy-one years. He has been under observation for a period of thirteen years and during this time his blood Wassermann reactions have been repeatedly negative, with and without provocative tests, and except for a transient left hemiparetic attack, when his blood pressure was markedly increased, he has never had a confining illness or enjoyed other than good health.

The interval between the film and the attached electrocardiogram is nine years, and the only significant change is that in the electrocardiogram, which now shows evidence of coronary sclerosis (Plates 23, 24).

We are permitted to believe that in the first patient a luetic aortitis was combined with a hypertension heart and coronary sclerosis, on an arterio-sclerotic basis, and was the determining factor in his rather early demise, while, in the latter, the absence of a luetic factor contributed to his greater comfort and longevity.

Warthin, in a comparision of the incidence of coronary sclerosis, myocardial infarction and coronary thrombosis, in 1,174 autopsies of nonsyphilitics and 501 syphilitics, came to the conclusion that syphilis is a predisposing and important factor in the production of arteriosclerosis of the aorta and coronary arteries, but that the syphilitic lesion, itself, rarely produces coronary sclerosis or occlusion.

Clawson and Bell, however, in a detailed pathologic study of twenty-eight cases, selected from a group of one hundred and twenty-six of syphilitic aortitis, said "that nothing was seen in microscopic sections of the coronary arteries that was different from ordinary senile arteriosclerosis. That a sclerosis of this kind and degree is not infrequent in persons over forty-five years of age, and apparently not a factor of importance in producing heart failure."

Summary

An attempt has been made to correlate, without resorting to set cardiac measurements, the roentgen ray shadow contour of clinically observed large hearts in adults, with the clinical symptoms and autopsy findings, in an effort to appraise its merits in the diagnosis of the cardiac cases selected.

1. A knowledge of the significance of such contours permits the clinician to obtain rapid information with fluoroscope, alone, and, by use of the orthodiagram, a quick permanent record both of the heart shape and size.

2. It is particularly useful in the combined types of valvular lesions, where auricular fibrillation and congestive heart failure have changed the characteristic murmurs and obscured the type of heart failure.

3. The fluoroscopic screen permits of a rapid and accurate method by which a dilatation of the aortic arch or the pulmonary area can be determined.

4. It offers an accurate method for determining changes occurring in the size and shape of the cardiac outline during the progress of disease, being especially useful in pericarditis with effusion.

5. In determining cardiac function, it offers little help.

6. It may be said that the roentgen ray shadow heart contour is a valuable accessory method in the diagnosis and care of heart disease when combined with the clinical symptoms, findings, and the electrocardiogram.

7. In those painful types of heart disease where often all methods of exact diagnosis fail, it is well to remember the advice of the elder Dr. Janeway, who, in discussing angina pectoris, said, "that, when he disregarded the patient's story and relied solely on his own calm judgment, he usually made a mistake."

I wish to acknowledge my indebtedness to Dr. John F. Noble and Dr. Kano Ikeda for the autopsy records of these patients.

References

Assmann, Herbert: Klinische Roentgendiagnostik der inneren Erkrankungen Dritte Auflage Vogel. Leipsig. pp. 31-155.

Brooks, Harlow: Angina pectoris. Harper's Med. Monograph, p. 127, 1929.

Chandlee, Gertrude Jackson, and Holmes, E. Burville: Clinical and roentgen ray findings in the study of the heart and great vessels. Am. Jour. Med. Sci., 178:364-378, 1929.

Clawson, B. J., and Bell, E. T.: The heart in syphilitic aortis. Arch. Path., 4:922-936, 1927.

Cohn, Alfred E.: Aging of the heart muscle, regarded from a general biologic point of view. Am. Jour. Med. Sci., 177:619-638, 1929.

Juster, L. R., and Pardee, H. E. B.: Abnormal electrocardiograms in patients with syphilitic aortitis. Am. Heart Jour., 5:84-92, 1929.

Köhler, Alban: Roentgenology—the borderline of the normal and early pathological in the skiagram. Rendered into English from the fifth German edition by Arthur Turnball. pp. 336-373.

Lewis, Sir Thomas: Diseases of the Heart. New York: Macmillan Co., 1933. p. 116.

Matthes, M.: Textbook of Differential Diagnosis. Authorized translation of the fourth German edition with extensive additions, by I. W. Held and H. M. Gross. Philadelphia: P. Blakiston's Sons and Co. pp. 431-439.

Rösler, Herman (Vienna, Austria): Personal communication.

Rösler, Herman, and White, Paul D.: Unusual variations in the roentgen shadow of the elongated thoracic aorta. Am. Heart Jour., 6:768-777, 1931.

Warthin, Alfred Scott: Syphilis in the etiology of angina pectoris. Am. Heart Jour., 6:163, 1930.

White, Paul D.: Heart Disease. New York: Macmillan, 1931. pp. 143-183.

White, Paul D., and Camp, Paul D.: A comparison of orthodiagraphic and teleroentgenographic measurements of the heart and thorax. Am. Int. Med., 6:469-481, 1932.

VERRUCA SENILIS AND KERATOMA SENILE*

HAMILTON MONTGOMERY, M.D.

Rochester, Minnesota

I WISH to depict the differences between verruca senilis and keratoma senile because, in spite of recent articles in the literature,[1, 2, 3, 4, 5] these two common conditions continue to be confused with each other. They represent two separate and distinct entities. Verruca senilis is a benign epithelial nevus, whereas keratoma senile belongs in the group of precancerous dermatoses.

Verruca Senilis (Seborrheic Keratosis)

Verruca senilis usually develops in the later decades of life as multiple lesions. These verrucæ vary greatly in size and occur chiefly on the trunk in the so-called seborrheic areas, although at times they appear in large numbers on the face also (Fig. 1*a*). They are not seen on the mucous membranes, the palms, or the soles. The lesions usually begin as small, light-yellow areas which increase in size and become more deeply pigmented, so that many of them are deep brown or even bluish brown when fully developed. They are usually covered with a thin greasy scale which is readily removed by gentle friction; they have the appearance of being "stuck on" the skin. A granular-appearing surface frequently results due to small plugs. When the lesions are elevated or pedunculated and deeply pigmented, they may be confused with benign pigmented nevi (Fig. 1*b*). The latter, however, do not have a soft, greasy plug. When the lesions occur on the face, many may show relatively little pigment and have a warty character, but even here the crust is softer and the lesions lack the induration palpable in keratoma senile; nor is there any inflammatory reaction around the lesion, as is commonly the case in keratoma senile. Occasionally it may be necessary to take a specimen for biopsy in order to differentiate the early, non-elevated verrucous form of verruca senilis from an early lesion of keratoma senile. Because of the deep brown, almost black, appearance of some of the lesions, at times they have been excised on the basis of being melanomas. The latter have a slate blue or slate gray color and lack the other features of verruca senilis. Nevus blau (blue nevus of Jadassohn) presents a smooth surface without scales and a bluish rather than brownish pigmentation. Dermatosis papulosa nigra,[4] occurring among negroes, although developing earlier in life, is merely a variant, I believe, of verruca senilis and presents a similar histologic picture.

---

*From the Section on Dermatology and Syphilology, The Mayo Clinic, Rochester, Minnesota.

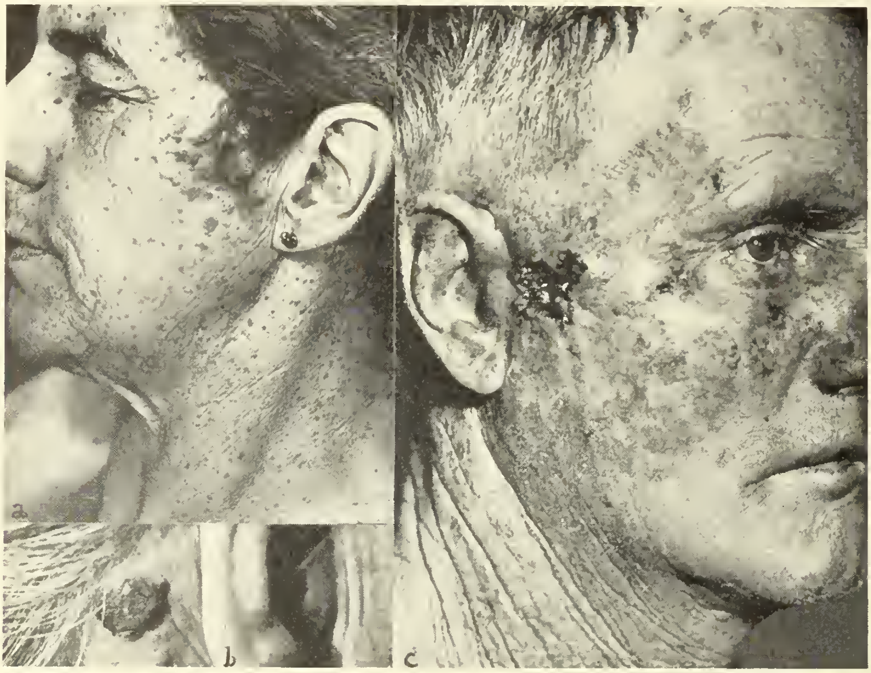


Fig. 1. Verruca senilis: *a,* This woman, aged sixty-one years, had had the lesions for ten years; there were also many lesions on the trunk. Biopsy of two borderline lesions confirmed the clinical impression that all lesions in this case were verruca senilis, and that none were keratoma senile. The variation in size and elevation of the lesions will be noted. *b,* This deeply-pigmented elevated lesion back of the ear should be differentiated from a benign pigmented nevus. *c,* Keratoma senile: The discrete lesions and plaques on the face, forehead, and ears may be noted, as well as the epithelioma, which arose, presumably, from a senile keratoma; histologically this lesion proved to be of the squamous cell variety, grade 2, with individual cell keratinization.

Verruca senilis, histologically (Fig. 2*a*), shows a varying picture whether the tumor is elevated or verrucous in character; in all types, however, there is definite cyst formation which is not traceable as a rule to the hair follicles or sebaceous glands but represents invagination of the epidermis. There is marked pigmentation of basal cells, and also acanthosis and prolongation of the rete ridges and a definite regular cycle of keratinization which result in epithelial cysts. There are relatively few mitiotic figures, and usually there is little inflammatory reaction in the cutis. The lesions should not be confused microscopically with pigmented basal cell epithelioma or with tricho-epithelioma (epithelioma adenoides cysticum).[5]

Whereas there have been occasional reports of malignancy occurring in verruca senilis,[6] usually basal cell in type, in my experience this has happened only when the lesion has been subjected to repeated irritation or trauma. Verruca senilis must be regarded as a benign dermatosis, probably a delayed epithelial nevus, and need be removed only for cosmetic purposes or when located in areas subject to trauma or irritation. As the lesions do not extend below the level of the epidermis, they may be removed by fulguration or cautery as well as by excision. They do not respond well to radiotherapy because of the marked degree of differentiation of the individual cells.

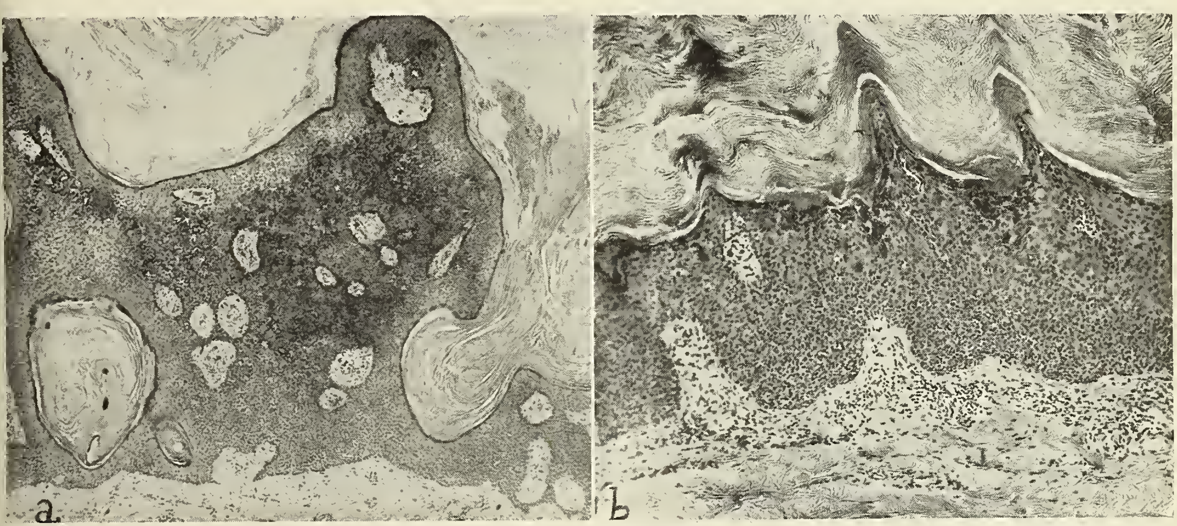


Fig. 2. *a,* Verruca senilis: Section of lesion in Figure 1 *b,* showing mixture of verrucous and solid forms. The deposits of melanin pigment and cyst formation may be noted. (Silver nitrate and hematoxylin stains.) b, Keratoma senile: The infiltrate in the cutis, lack of pigmentation, and early phenomena of dyskeratosis of the cells of the epidermis may be noted. (Hematoxylin and eosin stains.)

Keratoma Senile

Keratoma senile (Fig. 1*c*) also occurs in elderly individuals and the lesions are found chiefly on the exposed surfaces of the body, especially among persons who have a sandy complexion and who are frequently exposed to the elements (sailors' skin). The lesions may, however, be found on any part of the body. They appear as discrete, sharply circumscribed, flat, elevated or verrucous, brown to grayish, keratotic papules, or as ill-defined, scaling patches. The scales tend to be adherent, and their removal may result in points of bleeding. There is an appreciable induration to the lesions on palpation and often a zone of erythema surrounds a papule or plaque. When the latter is present, it is frequently indicative of early malignant change. Occasionally, keratoma senile develops into a cutaneous horn (cornu cutaneum).

The histologic picture of keratoma senile is much less distinctive than that of verruca senilis. In the early stages of the disease it may resemble that of an ordinary wart, but, shortly, various phenomena of dyskeratosis (Fig. 2*b*) and individual cell keratinization are seen in the prickle cell layer, eventuating in many instances in an epithelioma in situ and showing all the microscopic features of Bowen's disease. As a rule, very little pigment is seen in the basal cells, and there is definite infiltration of cells in the cutis. Malignant change in one or more of the lesions occurs in from 20 to 25 per cent of the cases of keratoma senile, and, when epithelioma is present, in more than 90 per cent of the cases it is squamous cell in character and varies from grade 1 to grade 4 in malignancy. There may be microscopic evidence of epithelioma in situ without clinical evidence of the lesion being epitheliomatous, and the lesion may persist for many years without developing into an invading squamous cell epithelioma, hence the inclusion of keratoma senile among the so-called precancerous dermatoses. In a few instances keratoma senile histologically reveals prolongation of the rete ridges in narrow strands, and it is in these instances that one may anticipate the development of basal cell, rather than squamous cell, epithelioma.

Keratoma senile should be destroyed by fulguration, surgery, or excision, with the realization that the lesion may extend deeply heneath the epidermis and is not "stuck on" as is the lesion of verruca senilis. Because lesions of keratoma senile histologically frequently simulate the picture of Bowen's disease, which picture is also frequently present in early epithelioma from roentgen rays, treatment with roentgen rays or radium is contraindicated.

Bibliography

1. Eller, J. J., and Ryan, V. J.: Senile keratoses and seborrheic keratoses; differences clinically, histologically and in susceptibility to malignant change. Arch. Dermat. and Syph., 22:1043-1060, (Dec.) 1930.
2. Freudenthal, Walter: Verruca senilis und Keratoma senile. Arch. f. Dermat. u. Syph., 152:505-528, 1926.
   Freudenthal, Walter, and Spitzer, R.: II. Warzen und Kondylome: Geschwülste der Haut. In: Jadassohn: Handbuch der Haut und Geschlechtskrankheiten. Berlin, Julius Springer, pp. 33-207, 1933.
3. Hookey, J. A.: Keratoma senilis and verruca senilis; clinical and histopathologic study. Arch. Dermat. and Syph., 23:946-959, (May) 1931; Proc. Staff Meet., Mayo Clinic, 5:239-241, (Aug. 27) 1930.
4. Michael, J. C., and Seale, E. R.: Dermatosis papulosa nigra. Arch. Dermat. and Syph., 20:629-640, (Nov.) 1929.
5. Montgomery, Hamilton, and Dörffel, J.: Verruca senilis und Keratoma senile. Arch. f. Dermat. u. Syph., 166:286-296, (Sept.) 1932.
6. Pinkus, F.: Über einen Fall von Basalzellenepitheliom auf Verruca senilis. Arch. f. Dermat. u. Syph., 169:58, (Sept.) 1933.

ESSENTIAL HYPERTENSION AND TUBERCULOSIS

CARL G. MORLOCK, M.D.†

Rochester, Minnesota

THE study of arterial hypertension in pulmonary tuberculosis has attracted attention for a long time. Marfan in 1891 reported that hypotension was the most common finding in tuberculosis, and reaffirmed this in 1907.[10] He said that a normal or habitually elevated blood pressure had a favorable prognosis in chronic pulmonary tuberculosis, whereas a continuing low blood pressure was of poor prognosis. He also cited the finding of hypotension as an aid in the diagnosis of pulmonary tuberculosis, and considered it a valuable observation in conjunction with an unexplained albuminuria in making a diagnosis of renal tuberculosis in the presence of a known tuberculous focus. Pottenger[14] and Bethea[2] reached similar conclusions. Fishberg[8] said that phthisic subjects have a blood pressure that is lower than normal. In a series of 464 cases of pulmonary tuberculosis, Stivelman[18] found a hypotension in 90 per cent, and a normal blood pressure in the remaining 10 per cent. In this latter group the mean systolic pressure did not exceed 135 mm. of mercury. Glaros[9] found that regardless of the clinical course of the disease, the blood pressure in pulmonary tuberculosis was normal or below normal in 99 per cent of cases. Brelet[3] cited a case in which the blood pressure was extremely variable. The systolic blood pressure ranging between 240 and 70 mm. of mercury and the diastolic blood pressure varying between 140 and 45 mm. of mercury. The ultimate diagnosis in this case was not made until necropsy revealed an extensive caseous pulmonary tuberculosis. Brelet explained the hypotensive exacerbations by assuming a depressant action on the vasomotor mechanism by the toxins of the tubercle bacilli.

In renal tuberculosis, opinions of writers regarding blood pressure observations correspond to those with reference to pulmonary lesions. Pousson and Desnos[15] said that in renal tuberculosis the blood pressure on the whole is normal or below normal, though a minor hypertension may coexist. Reitter[16] reported ten cases of known renal tuberculosis and in six of the cases the systolic pressure was 90 mm. of mercury or lower, in two cases it was normal, and in one case there was a definite hypertension, the systolic pressure being 160 mm. of mercury. Reitter[16] believed that in cases of gross urinary infection, a coexistent hypotension could be used as an aid in establishing the tuberculous nature of the lesion. Elaut[7] on the other hand, did not believe that the blood pressure curve was dependent on the presence of renal tuberculosis. In a review of twenty cases, he found that the average values for arterial tension were 145 mm. of mercury for the systolic pressure and 70 mm. of mercury for the diastolic pressure.

Barbier and Cibert[1] reported a case of active unilateral renal tuberculosis in which the systolic blood pressure was 240 mm. of mercury and the diastolic pressure was 100 mm. of mercury. In following this case after nephrectomy, within one month they found a reduction of arterial tension to 170 mm. of mercury for the systolic, and 100 mm. of mercury for the diastolic blood pressure.

---

†Fellow in Medicine, The Mayo Foundation, Rochester, Minnesota.

Morlock and Horton[12] have studied a much larger series of cases of renal tuberculosis at The Mayo Clinic. In a critical review of 346 cases of proved renal tuberculosis, in which nephrectomy was carried out, it was found that the vast majority of subjects (approximately 78 per cent) had normal blood pressures; 20 per cent had hypertension, that is, a systolic reading of 140 mm. of mercury or above; and approximately 2 per cent had hypotension, that is, a systolic blood pressure below 100 mm. of mercury. For the various age groups, we have regarded a systolic pressure which ranges from 100 to 140 mm. of mercury as being normal. The ages of the subjects ranged from eleven to sixty-eight years. The number of subjects in this series who had hypotension and hypertension is probably not any greater than one would expect to find in a control series of so-called normal subjects in the same age groups. While making this study, the following case was observed and seems worth reporting in detail because of the association of relatively severe hypertension with clinically healed renal and pulmonary tuberculosis.

A man, forty-seven years of age, presented himself at the clinic on October 2, 1934, for advice regarding hypertension, which he had been cognizant of for ten years. When he first consulted a physician elsewhere ten years ago, a systolic blood pressure of 200 mm. of mercury was noted. His family history is of interest. His grandmother (side of family tree not stated in history) had had hypertension, his father had died of "acute indigestion," his mother, who is still living, had tuberculosis (apparently pulmonary) and now has hypertension. Twenty-six years ago he had first sought medical advice elsewhere because of dyspnea, urinary frequency and urgency, and hematuria. At that time, examination had revealed evidence of bilateral active pulmonary tuberculosis, with fever and general malaise. Cystoscopic examination had disclosed an ulcerated area at one ureteral orifice (he did not recall which one) and a diagnosis of tuberculosis of the bladder had been made. A regimen of rest had been prescribed, a high caloric diet had been recommended and the bladder had been treated locally. In six months he had improved to such an extent that he had returned to work, although the vesical symptoms had continued for ten years. During the past fifteen years he had had no urinary symptoms except transient burning on micturition, which had required no treatment. His history otherwise did not reveal anything abnormal.

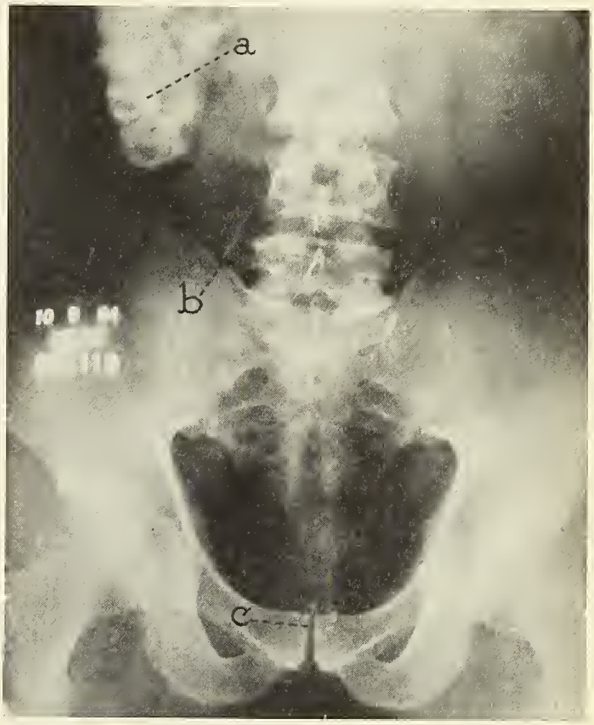


Fig. 1. *a*, Extensive calcification of the right kidney; *b*, right ureter; *c*, discrete areas of calcification in the region of the prostate.

On examination he was found to be a well-nourished man, apparently in good health, whose height was 69 inches, and whose weight was 184 pounds. His temperature was 98.6° F., the pulse rate was 76 per minute, and the systolic blood pressure was 205, and the diastolic was 130 mm. of mercury. The pupils reacted to light and accommodation. The teeth were in good condition except for a mild degree of pyorrhea. The tonsils had been removed elsewhere. Examination of the chest revealed moderate emphysema and scattered moist râles in both apices on forced inspiration. The heart rate and rhythm appeared normal. The apical impulse was situated in the left fifth interspace, 10 cm. from the midsternal line, the aortic second sound was accentuated, grade 1+. The abdomen was normal; examination of the genitalia revealed bilateral testicular atrophy. The deep tendon reflexes were normal. Palpation of the peripheral vessels disclosed a rubbery type of sclerosis, grade 2. Examination of the ocular fundi showed generalized arterial narrowing 1+ of the hypertensive sclerotic type; the disks were normal.

The concentration of hemoglobin was 18.5 gm. per

100 c.c. of whole blood (by photo-electrometer), and the leukocytes numbered 5,200 per cubic millimeter of blood. The Wassermann reaction of the blood was negative. The value for urea was 26 mg. per 100 c.c. of whole blood. The urine was normal; the specific gravity was 1.026, and the reaction was acid. Roentgenograms of the thorax revealed evidence of healed pulmonary tuberculosis of both upper pulmonary fields. Roentgenograms of the kidneys, ureters, and bladder (Fig. 1) disclosed a large calcified mass in the right renal area, an elongated area of calcification opposite the last lumbar vertebra on the right side (calcified ureter), and small discrete areas of calcification in the region of the prostate. The electrocardiogram was normal except for slight left ventricular preponderance.

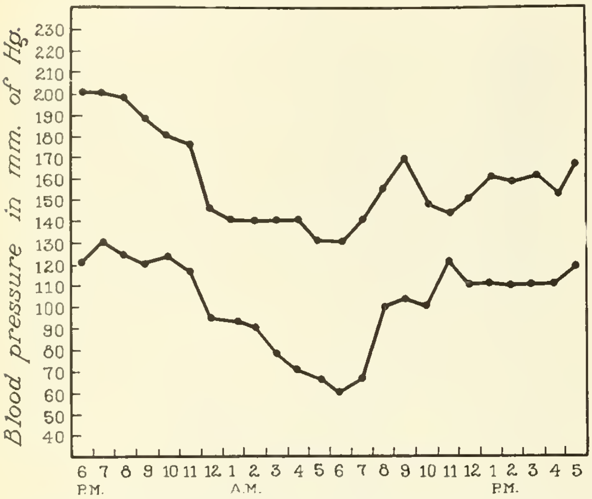


Fig. 2. Record of hourly blood pressure taken over a period of twenty-four hours while the patient was at rest. Fluctuations of this type are usually observed in cases of essential hypertension.

When the blood pressure was taken at hourly intervals over a period of twenty-four hours, while the patient was at rest, the systolic pressure ranged from 130 to 200 mm. of mercury and the diastolic pressure varied from 60 to 130 mm. of mercury (Fig. 2). Fluctuations of blood pressure of this degree are frequently observed in subjects with essential hypertension.

In a review of the pertinent literature on renal tuberculosis, one finds a general note of warning as to the seriousness of this condition. Wildboltz[19] noted that in 316 cases there was a mortality of 58 per cent within five years, and that only 6 per cent of these patients lived more than ten years. Persson[13] reported a mortality of 84.5 per cent within ten years of all cases in which nephrectomy was not carried out. He cited the records of two patients who were both clinically well after periods of seventeen and twenty-seven years, respectively. Caulk[4] and Persson[13] were of the opinion that it is impossible to demonstrate spontaneous healing of renal tuberculosis, though they admit clinical arrest by a process they term autonephrectomy. Medlar[11] proved to his own satisfaction that, in experimental animals, artificially produced renal tuberculosis could heal. D'Abreu[6] felt that eight years' quiescence of renal tuberculosis was notable. Christian and Vintinci[5] and Schall[17] each reported a single case in which complete calcification of the kidney, as revealed by the roentgenogram, apparently had resulted in arrest of the tuberculous process.

In consideration of the case presented, there are two notable features. First is the presence of a relatively severe essential hypertension in a case in which the patient had rather extensive clinically arrested tuberculous lesions in the lungs, right kidney, ureter, and prostate. Second is the apparent complete calcification and clinical arrest of a renal tuberculous lesion twenty-six years after a primary diagnosis.

Bibliography

1. Barbier, J., and Cibert, J.: Tuberculose rénale ouverte avec hypertension. Néphrectomie. Guérison clinique rapide et heureux effet de l'intervention sur hypertension. Lyon méd., 147:441-446, (Apr. 5) 1931.
2. Bethea, O. W.: Blood-pressure in pulmonary tuberculosis. New Orleans Med. and Surg. Jour., 81: 314-316, (Nov.) 1928.
3. Brelet, M., and Perrin, P.: Hypertension artérielle et tuberculose. Gaz. de Hôp., 101:469-479, (Mar. 28) 1928.
4. Caulk, J. R.: Renal tuberculosis. Jour. Urol., 6:97-113, (Aug.) 1921.
5. Christian, E., and Vintinci, V.: Un cas de rein tuberculeux calcifié exclu. Jour. d'urol., 34:219-221, (Sept.) 1932.
6. D'Abreu, A. L.: Closed renal tuberculosis, with special reference to the possibility of healing this disease. Brit. Med. Jour., 1:605-606, (Apr. 8) 1933.
7. Elaut, L.: La tension artérielle chez les urinaires. Jour. d'urol., 29:441-458, (May) 1930.
8. Fishberg, Maurice: Pulmonary tuberculosis. Philadelphia: Lea and Febiger, Ed. 3, pp. 281, 1922.
9. Glaros, Constantin: Tension artérielle et tuberculose. Presse méd., 2:1579-1581, (Dec. 12) 1928.
10. Marfan, A. B.: Tuberculose pulmonaire chronique et son importance pour le pronostic. Rev. de méd., 27:1005-1022, 1907.
11. Medlar, E. M., and Sasans, K. T.: Experimental renal tuberculosis: with special reference to excretory bacilluria. Am. Rev. Tuberc., 10:370-383, (Dec.) 1924.

12. Morlock, C. G., and Horton, B. T.: Variations in blood pressure in renal tuberculosis. Proc. Staff Meetings of Mayo Clinic, 10:101-102, (Feb. 13) 1935.
13. Persson, Mauritz: Renal tuberculosis: a clinical survey of 295 cases, 90 of which were not operated on. Ann. Surg., 82:526-551, (Oct.) 1925.
14. Pottenger, F. M.: The effect of tuberculosis on the heart. Arch. Int. Med., 4:306-322, (Oct.) 1909.
15. Pousson, A., and Desnos, E.: Encyclopédia Française d'Urologie. Paris: Octave Doin et Fils. 2: pp. 764, 1914.
16. Reitter, Karl: Nierentuberculose und arterielle Hypotension: Ein differentialdiagnostisches Symptom von praktischer Bedeutung. Ztschr. f. klin. Med., 62:359-367, 1907.
17. Schall, L.: Die Mörtelniere, Endstadium einer kindlichen Nierentuberkulose. Deutsch. med. Wchnschr., 2:1975-1977, (Nov.) 1931.
18. Stivelman, B. P.: Observations on the blood pressure in pulmonary tuberculosis. Am. Jour. Med. Sc., 173:46-59, (Jan.) 1927.
19. Wildboltz: Quoted by Eisendrath, D. N., and Rolnick, H. C.: In: Text-book on urology. Philadelphia: J. B. Lippincott and Company, pp. 717, 1928.

HERPES ZOSTER OPHTHALMICUS*

PAUL D. BERRISFORD, M.D.
Saint Paul

WHETHER herpes zoster is a clinical entity has occupied the minds of clinicians for some years. The etiology of a group of infectious diseases characterized by vesicular eruptions such as sheep pox, horse pox, cow pox, varioloid, alastrim, chicken pox, herpes zoster, herpes simplex and epidemic encephalitis, is, in this regard, called into question. While one in the group may resemble another, others show nothing in common. Experimental evidence is not as yet forthcoming to prove their kinship. In this regard, experimental research has led to the conclusion that herpes zoster ophthalmicus has no common relationship with dendritic or stellate keratitis.

There has appeared in the literature much dealing with the association of herpes zoster with varicella. Le Feuvre[6] holds that herpes zoster may, when it occurs under certain conditions, be the start of a chicken pox epidemic. Savin[10] contends that either disease may cause the other, the causal factor having two phases, one generalized causing varicella, the other localized and giving rise to herpes zoster.

Although herpes zoster is included among those diseases caused by a filtrable virus, there is no direct evidence that such is the case. That it is due, in all probability, to a filtrable virus is inferred by the fact that every attempt to find a culturable bacterium has ended in failure. In addition, there are found nuclear inclusions in the epithelial cells of the lesions similar to those produced by the virus of herpes febralis.

However some progress has been made experimentally. Netter and Urbain,[9] Bedson and Bland,[2] Aitken and Brain,[1] have shown that the serum of herpes zoster convalescents contains specific antibodies whose presence can be detected by the complement-fixation reaction, using, as antigen, diluted zoster vesicular fluid or a suspension of crusts of the zoster skin lesion. The most that can be said at the present time is that herpes zoster is the result of a specific substance, which, when the disease has run its course, leaves evidence of its former existence through the presence of antibodies in the serum.

Attempts to transmit the disease to animals have proven a failure. Cole and Kuttner[3] of the Rockefeller Institute, working with rabbits, guinea pigs and monkeys, met with no success. They have shown, however, that the disease is contagious, a fact suggested prior to their work by repeated epidemic outbreaks, especially during the summer and late fall. As proven by the above named workers, one attack of herpes zoster usually confers immunity.

As far back as 1862 the pathologic condition in herpes zoster, while not definitely known, was correctly surmised. Campbell and Head,[4] in 1900, exhaustively studied seventeen cases the duration of which varied from a few days to one and one-half years and in all cases there were found hemorrhages in the posterior root ganglia, usually small and surrounded by considerable inflammatory exudation. The ganglion cells were destroyed in varying extent and in the late cases the ganglia were markedly sclerosed. Where herpes zoster affected the area supplied by the opththalmic division of the fifth nerve, all showed the lesion to be in the Gasserian ganglion.

---

*Read at the meeting of the Miller Hospital Staff, February 5, 1935.

General paralysis, tabes, the prolonged use of arsenicals, influenza, the administration of antityphoid vaccine are said to be predisposing factors in the production of the disease. Herpes zoster occurs mostly in the middle-aged, occasionally in children. In the aged it takes on a more virulent form.

As a rule there is a prodromal period of three or four days antedating the rash. Over the area of future vesication there generally occurs burning or lancinating pains. During the period of hyperesthesia, temperature is usually present; then follow the stages of erythema, vesication and rupture of the vesicles, cicatrization and finally anesthesia. In some cases the pain is very severe and the absence of some degree of anesthesia is infrequent.

The ophthalmic division of the fifth nerve before entering the superior orbital fissure gives off a branch to the meninges, the involvement of which may cause intense headaches and vomiting. The naso-ciliary nerve innervates large areas of the mucous membrane of the nasal septum and the outer wall of the antrum; its involvement in the process gives rise to most disagreeable nasal symptoms. It is affected in about 50 per cent of cases.

Foster Moore[8] states that ocular complications such as corneal involvement, iridocyclitis, ocular palsy or optic atrophy, follow in the wake of the eruption in herpes zoster ophthalmicus in 60 per cent of cases.

There is usually hyperemia of the conjunctiva, not seldom pronounced conjunctivitis. When the cornea is involved the disease takes on protean forms. It may be the seat of patchy interstitial inflammation, or the appearance of the cornea may simulate a dendritic keratitis, gray striæ extending in one or more directions from the minute ulcer, throwing off branches and finally breaking down. Large ulcers may form, enlarge and fuse, with considerable denudation of the epithelium, leaving a craterlike border. These ulcers are always superficial unless they become infected, when they then extend into the depths, producing an hypopion. They are characteristically chronic and are prone to relapse. Occasionally the surface of the cornea is raised to form vesicles and, later, small ulcers.

Iridocyclitis frequently appears alone or associated with corneal involvement. Secondary glaucoma may result although hypotension is the more frequent accompaniment of this disease.

Hunt[5] collected 158 cases of paralyses of various parts of the body which occurred in herpes zoster and, of these, eighteen showed paralysis of the third nerve. Metz[7] collected fifty case of ocular palsy accompanying herpes zoster and found the third nerve partially or completely paralyzed in 74 per cent of them. It has been observed in most cases of this nature that there is a partial or eventually a complete recovery.

In the few cases of optic atophy reported as the result of herpes zoster, no previous ophthalmoscopic examination had been made, thus rendering herpes zoster, as the etiological factor, questionable.

The explanation of the ocular disease on the basis of the site of the lesion meets with difficulties. We regard sensory nerves as conveying afferent impulses only. Why a block in the course of the nerve should produce trophic changes in structures at its distal terminations is not clear. While it is true that scrupulous care exercised in preventing mechanical injury to the desensitized cornea, even suturing the eyelids together, may prevent in many cases corneal involvement, nevertheless such measures may prove of no avail. However, we know that section of motor nerves produces trophic changes in skeletal muscles, which becomes atrophic and finally are reduced to connective tissue. Nevertheless, as stated by Starling,[11] "Whether we are justified in assuming the existence of trophic nerves exerting an influence on the part they supply apart from any influence on its other functions, experimental evidence is not sufficient to decide." It would appear, then, that any interference of sufficient degree with motor or sensory physiological activity of a part may produce trophic changes. To assume that sensory nerves are capable of antidromic impulses is untenable.

The treatment of the disease should be symptomatic and along the lines generally employed for iridocyclitis and corneal affections. For pain, the salicylates or morphine or its derivatives, hot fomentations locally, holocaine, et cetera, are indicated.

In reviewing articles dealing with the treatment of herpes zoster the writer finds the following therapeutic agents recommended: autoserotherapy, the high frequency current, deep x-ray radiation, ultra-violet ray, sodium iodide, arsphenamine, neoarsphenamine, sulpharsphenamine, et cetera. The author believes that herpes zoster is a self-limited disease for which the above named therapeutic agents have no special specificity, indeed little if any value. The condition when first seen is usually in full bloom, with a fully established focal pathology, and nature has already started the patient on the road to recovery.

The most that we can hope to do is to keep the patient as comfortable as possible through the relief of pain, and so guide the course of the eye affection as to avoid, if possible permanent ocular impairment.

Case Reports

Case 1.—Mr. E. E. C. of Deer River, Minn., a material checker, while weighing a load of cement, thought a gust of wind had carried some of the material into his eyes. Four days later he consulted the local physician because of pain in the corner of his right eye. Ten days later blisters appeared over the right side of the forehead and the right eyelids.

When seen, sixteen days after the alleged accident, the patient complained of reduced vision in the right eye as well as a constant burning, smarting and itching of the affected eye. Ophthalmologic examination showed the vision of the right eye to be 20/40ths. Bulbar and tarsal conjunctival infection was present, with passive congestion of eyelids. There were deep ciliary injection and fibrin deposits on the posterior surface of cornea. The pupillary border of the iris was almost completely bound down to the anterior capsule of the lens, and there were fibrin deposits on the anterior surface of the lens in the pupillary area. The fundus could not be seen owing to the fibrin deposits on the posterior surface of the cornea, and the anterior surface of the lens, and vitreous opacities. Ocular tension on palpation appeared normal. The cornea was absolutely anesthetic. Over the right side of the forehead were blotchy areas of skin pitting, evidence of former vesication. The skin showed marked reduced sensibility over the forehead and upper right eyelid.

The patient was given three intravenous injections of triple typhoid vaccine during the course of a week, sun-lamp treatments daily, and, locally, hot fomentations and the usual regime for iridocyclitis. He was discharged after ten days in the hospital.

A month later there was a marked dermatitis involving the right eyelids and contiguous parts, the skin being dusky red, encrusted and very irritated. The iridocyclitis had greatly subsided but the pupillary border was free only "in notches." Vision was corrected to 20/40ths.

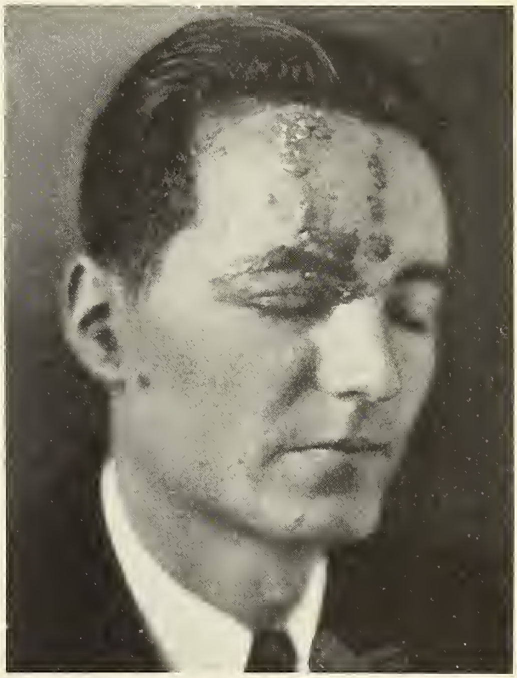


Fig. 1. Case 2 (see text).

After a few days in the hospital, the patient developed pain in the right fingers followed soon after by the appearance of large serous blebs over the affected parts. After remaining again ten days in the hospital he was discharged, the iridocyclitis having completely subsided but the corneal anesthesia still remaining. Vision with correction 20/40ths.

Case 2.—Mr. F. A. H., pattern maker, aged twenty-six, stated that four days previous he was taken with a pain in the right cheek, right forehead and over the right side of the nose. Serous blebs were linearly distributed in a perpendicular direction over the skin of the right forehead, over the surface and the tarsal border of the upper right eyelid and on the right side of the nose. The bulbar and tarsal conjunctivæ were injected and the cornea showed relative anesthesia.

Nine days later ciliary injection appeared and with it the presence of a small linear ulcer near the corneal center. The corneal lesion showed gradual improvement only to be followed by an exacerbation six days later when there appeared several cup-shaped, tiny ulcers distributed over the corneal surface. Three weeks later the corneal lesions had completely healed but there still remained relative anethesia of the cornea as well as the skin of the right forehead, and right upper eyelid. The vision was unimpaired but the forehead was left deeply pitted.

Case 3.—Mr. O. T., aged thirty-four, a brewery employee, was exposed to wide ranges of temperature, being constantly in and out of a refrigerator. Three days previous "he thought he got something into his left eye." About this time an eruption broke out on the left side of his forehead attended with swelling beneath his left eye. He gave no history of neuralgic pains.

Examination disclosed a linear group of vesicles coursing perpendicularly up the skin of the left forehead with two blebs involving the left upper eyelid. In addition there was an edematous patch beneath the left eye.

There existed a moderate degree of conjunctival congestion, a relative anesthesia of the left cornea but no other ocular involvement. Convalescence was uneventful.

Case 4.—Mr. O. M., high school teacher, aged fifty-five. Two weeks previous the left eye felt as though a foreign body were in it and this feeling had persisted. About five days later the left side of forehead showed diffuse swelling with a patch of edema involving the inner third of the left eyebrow and a large patch immediately below the left eye. Two days later the forehead showed over its congested surface a studding of vesicles.

The left forehead, left eyelids and left cornea showed lessened sensibility to touch. In the center of the cornea were tiny areas of superficial infiltration with a moderate degree of circumcorneal injection. The ocular pain, lachrymation and photophobia were intense.

After the subsidence of the ocular symptoms neuralgic pains over the left forehead persisted for some weeks and a relative anesthesia of the left cornea and forehead.

Bibliography

1. Aitken, R. S., and Brain, R. T.: Facial palsy and infection with zoster virus. Lancet, 1:19-22, (Jan. 7) 1933.
2. Bedson, S. P., and Bland, J. O. W.: On supposed relationship between viruses of herpes febrilis and vaccinia. Brit. Jour. Exper. Path., 9:174-178, (Aug.) 1928.
3. Cole, R., and Kuttner, A. G.: Etiology of herpes zoster. Jour. Exper. Med., 42:799-820, (Dec.) 1925.
4. Head, H., and Campbell, A. W.: The pathology of herpes zoster and its bearing on sensory localization. Brain, 23:353-523, 1900.
5. Hunt, J. R.: On herpetic inflammations of the geniculate ganglion. A new syndrome and its complications. Jour. Nerv. and Ment. Dis., 34:73-96, (Feb.) 1907.
6. Le Feuvre, W. P.: A plea for the recognition of a common origin for shingles and chickenpox. Brit. Jour. Dermat., 29:256-262, (Oct.) 1917.
7. Metz, R. B.: Herpes zoster ophthalmicus complicated by ophthalmoplegia. Ohio Med. Jour., 9:590-593, (Dec.) 1913.
8. Moore, R. F.: Ocular manifestations of lesions of fifth cranial nerve. Brit. Med. Jour., 2:783-786, (Oct. 29) 1932.
9. Netter, A., and Urbain, A.: Nouvelles recherches sur la déviation du complément dans le zona. L'antigène du zona n'exerce aucune action sur le sérum des sujets atteints d'herpes. Comp. rend. Soc. de biol., 90:461-464, 1924.
10. Savin, L. H.: Discussion of relationship, direct or indirect, between certain cases of herpes ophthalmicus and varicella. Tr. Oph. Soc. U. Kingdom, 53:271-281, 1933.
11. Starling, E. H.: Principles of Human Physiology. Philadelphia, Lea and Febiger Co., 1920, 3rd ed., p. 349.

SOME OBSERVATIONS ON THE INTRANASAL OPERATION FOR FRONTAL SINUSITIS*

CARL M. ANDERSON, M.D.

Rochester, Minnesota

IN a recent investigation to determine the principal causes of failure of operations for the relief of frontal sinusitis, it was found that a large percentage of failures were the result of incomplete intranasal operations and a collapse of the soft parts into the frontal sinus and nasofrontal duct, in cases in which the bony wall of the sinus had been removed by an external operation.[1] In nearly all cases that were reviewed, the immediate result of operation seemed good; all symptoms subsided promptly, and one was led to believe that the cure would remain permanent. After several months, and in some instances after several years, there was a return of symptoms; this probably was the result of reinfection; but some form of obstruction to proper drainage had taken place, which prevented the prompt resolution of the acute process.

---

*From the Section on Otolaryngology and Rhinology, The Mayo Clinic, Rochester, Minnesota. Read before the Minnesota Academy of Ophthalmology and Otolaryngology, at Rochester, Minnesota, April 12, 1935.

The conclusion was reached at that time that, if a method could be devised by which the bony structure, which surrounds the frontal sinus and the nasofrontal duct, could be preserved, and adequate drainage provided, the result probably would be more ideal than it had been. The failures with the intranasal operations appeared to be the result of incomplete removal of all the ethmoid cells, in the neighborhood of the nasofrontal duct, and the fronto-ethmoid cells, which may extend well up over the orbital wall. These cells often take up space which otherwise would be included in the frontal sinus. In many instances, the roof of a large fronto-ethmoid cell forms the floor of the frontal sinus.

In an effort to overcome the difficulties, which occur in many cases, as a late result of the external operation, and to provide an adequate nasofrontal duct that would remain patent, a great deal of attention was paid to the complete removal of all the cells in this region, by the intranasal route. In order to facilitate the removal of the anterior cells, it has been found necessary to flatten the agger nasi and to remove completely any cells which may be in it. A fairly large portion of the anterior end of the middle turbinate bone may have to be removed in order to provide for the complete removal of the bulla ethmoidalis and the uncinate process. If any of these structures are left in place, the approach is much more difficult, and there is a deep excavation with somewhat perpendicular walls which will probably fill in with granulations, instead of a rather large concave area with gently sloping sides, without anything to interfere with direct drainage of the frontal sinus into the nose.

In approaching any surgical condition one must always be prepared to meet each problem presented with the type of operation best suited to the individual or pathologic condition encountered. In the treatment of disease of the frontal sinus, as in the treatment of diseases elsewhere in the body, no one procedure can be considered to displace any other method entirely. One will always encounter cases in which necrosis of the bony structures has taken place, or polyps and degenerated membranes exist inside of the sinus to such an extent that an approach through the external wall becomes necessary in order to eradicate the disease completely. In a number of cases in which it seemed necessary to perform an external operation, drainage by the intranasal route proved entirely adequate to control the disease.

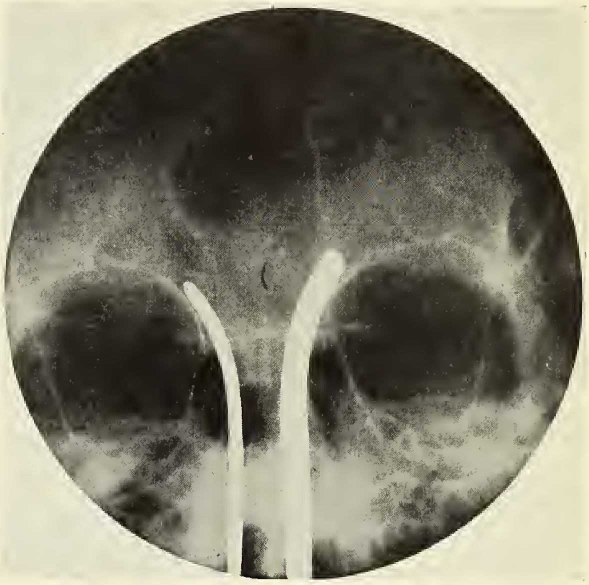


Fig. 1. Large dilator passed directly into the frontal sinus.

It would seem that the approach through the orbital wall, as advocated by Sewall and others, would, to a large extent at least, overcome the tendency of the soft parts to obstruct the frontal sinus and nasofrontal duct. With this type of operation, the periosteum lining the orbital cavity is dissected off and retracted with the orbital contents in order to expose the partition between the orbit and labyrinth of the ethmoid. This should restrain the tendency of the soft parts to bulge into and fill the cavities produced by the removal of bone.

In cases in which operation has been performed previously or in which infection has been present for a long time and has produced a regeneration of bone or thickening of the bones as a result of osteitis, the external approach is the method of choice.

Before about 1890, the approach to the frontal sinus had been by the external route. At this time, Schaeffer advocated the draining of the frontal sinus by enlarging the nasofrontal duct. About 1891, Winkler and Scheier demonstrated the relation of the frontal sinus to other structures in the upper portion of the nose and proved that it usually was practical to approach the frontal sinus by the intranasal route. In 1893, Jansen called attention to the great importance of cleaning out the anterior ethmoid cells thoroughly, and of removing the anterior portion of the middle turbinate bone in order to secure the largest duct and to maintain adequate drainage.

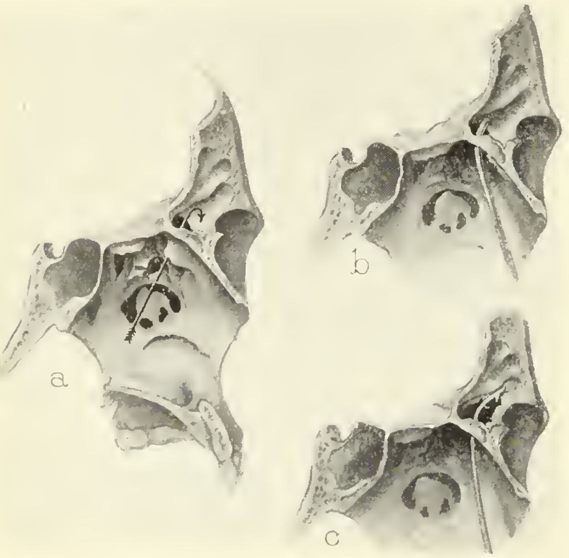


Fig. 2. *a*, Bony structure around the nasofrontal duct and the fronto-ethmoid cell, forming the floor of the frontal sinus; *b*, probe passed into the nasofrontal duct lateral to the fronto-ethmoid cell, and *c*, fronto-ethmoid cell broken down, providing direct drainage into the nasal cavity.

In a review of the anatomy of the middle turbinate bone, anterior ethmoid, and fronto-ethmoid cells, one finds that the nasofrontal duct is under the anterior end of the middle turbinate bone (Fig. 1) between the uncinate process and the bulla ethmoidalis. In this region one will often encounter several layers of cells. A rather deep cavity is formed laterally after the removal of these cells. In a large number of instances one encounters a large fronto-ethmoid cell, which extends up over the orbital roof. The superior wall of the cell forms the floor of the frontal sinus. In probing the frontal sinus (Fig. 2, *a, b* and *c*) this cell may readily be mistaken for the sinus. For the intranasal approach to the frontal sinus, anteroposterior and lateral roentgenograms are very essential. The lateral view will show the anteroposterior depth of the frontal sinus and the anteroposterior view will reveal the space available between the septum and the lateral wall of the nose. It also will show the relative position of the frontal sinus to the neighboring cells, particularly the fronto-ethmoid cells.

If there is any deflection of the nasal septum, it should be taken care of first, because if it is left in place it would interfere with the surgical approach and later might prevent proper postoperative treatment. The anterior third of the middle turbinate bone should then be removed by means of scissors or biting forceps. Following this, the agger nasi should be flattened with biting forceps; the flattening process should be completed with backward biting forceps. A modified Kerrison punch has been found to be very convenient for this purpose. It is very strong, takes a shallow bite, and allows one to work from above, and to exert what pressure is needed, downward and forward. In this way, a much better view can be obtained as well as an easier approach to the anterior ethmoid cells which surround the nasofrontal duct. Often, rather large cells are found in the agger nasi, which, if left, would spoil an operation which otherwise would be well done. Occasionally, one encounters rather dense bone in this region and may be forced to break through the mesial wall with a curet. Attention should be called to the proximity of the lacrimal bone and the lacrimal gland. These structures are situated slightly lower than the agger nasi, and in my experience they have not been injured in this type of operation. The bulla ethmoidalis, uncinate process, and anterior ethmoid cells should be removed next, by means of a biting forceps. If one proceeds slowly and carefully and does not attempt to remove a large portion at one time, no trouble will be encountered. The bones that form the lateral limit of the ethmoid cells are very thin but are much denser than those that form the cells. They can be recognized readily by means of a probe, which should be used frequently in order to keep within the limits of the ethmoid cells at all times. Occasionally bone which is somewhat resistant is encountered in ethmoid cells. In this case one should work forward, beginning the removal of the ethmoid cells near the attachment of the middle turbinate. No force should be used, except in a downward and forward direction.

In cases in which one encounters a large fronto-ethmoid cell, the roof of which forms the floor of the frontal sinus, the partition usually offers very little resistance and is easily removed. If resistance is encountered, a probe or curet can nearly always be passed through the osteum and into the frontal sinus, and the obstructing partition can be broken with a downward motion with the probe or curet. One now finds that there is a large direct opening into the frontal sinus. The floor of the sinus is formed by the superior internal wall of the orbit and there is nothing to obstruct free drainage into the nose. I have been able to pass a large dilator or the small end of a Faulkner ring curet directly into the frontal sinus. The last portion of the operation must be done without the aid of direct vision; consequently, caution should be used and no unnecessary force should be used at any time. If one pays close attention to the landmarks, studies the roentgenogram carefully, and keeps in mind the conformation of the sinus and that of the surrounding structures, no complications should be encountered.

In an early case, some irritation of the internal rectus resulted; this interfered with the rotation of the eye, and caused some diplopia. Apparently some inflammatory process developed from infection which penetrated through the orbital wall, or a hematoma formed. This irritation gradually subsided and there was a return to normal ocular function. After five years, this patient has had no recurrence of pain or discharge from the sinus.

In all cases in which an opportunity was afforded to observe the patients some months or years after operation, I have found a fairly large patent nasofrontal duct.

In cases in which complete ethmoidectomy and surgical treatment of the sphenoid sinus are indicated, it is a relatively simple procedure to extend the operation posteriorly by removing the remaining portion of the middle turbinate bone or by exenterating the ethmoid cells lateral to the turbinate bone, as indicated by the needs of the occasion. By keeping lateral to a line corresponding to the attachment of the middle turbinate bone, one will not injure the cribriform plate of the ethmoid bone, provided one proceeds with reasonable care and does not use any unnecessary force. The anterior wall of the sphenoid sinus can be removed rather easily and the floor of this sinus can be removed with the aid of a self-retaining nasal speculum.

Summary

In a large percentage of infections of the frontal sinus, good end-results can be obtained with the complete intranasal operation, and in most cases as much can be accomplished with this operation as with any other method. Great care must be taken to insure complete removal of all anterior ethmoid and fronto-ethmoid cells in cases in which disease has destroyed a portion of the anterior wall of the frontal sinus. In cases in which the bones that surround the nasofrontal duct have become thickened by disease or as the result of previous operation, the external route is the method of choice. If the results of surgical treatment of frontal sinusitis are judged by the appearance of the operative field or by the symptoms, less than one year after operation, a true conception of the efficiency of the surgical procedure will not be obtained.

Bibliography

1. Anderson, C. M.: External operation on the frontal sinus: causes of failure. Arch. Otolaryngol., 15:739-745, (May) 1932.
2. Jansen, A.: Zur Eröffnung der Nebenhöhlen der Nase bei chronischer Eiterung. Arch. f. Laryngol. u. Rhinol., 1:135-157, 1894.
3. Scheier: Quoted by Wright, Jonathan: A history of laryngology and rhinology. Ed. 2, Philadelphia, Lea and Febiger, 1914, p. 283.
4. Schaeffer: Quoted by Wright, Jonathan: A history of laryngology and rhinology. Ed. 2, Philadelphia, Lea and Febiger, 1914, p. 271.
5. Sewall, E. C.: External operation on the ethmo-sphenoid-frontal group of sinuses under local anesthesia. Arch. Otolaryngol., 4:377-411, (Nov.) 1926.
6. Winkler: Quoted by Wright, Jonathan: A history of laryngology and rhinology. Ed. 2, Philadelphia, Lea and Febiger, 1914, p. 283.

EDITORIAL

MINNESOTA MEDICINE
OFFICIAL JOURNAL OF THE MINNESOTA STATE MEDICAL ASSOCIATION
Published by the Association under the direction of its Editing and Publishing Committee

EDITING AND PUBLISHING COMMITTEE
J. T. CHRISTISON, Saint Paul   C. B. WRIGHT, Minneapolis
E. M. HAMMES, Saint Paul   T. A. PEPPARD, Minneapolis
WALTMAN WALTERS, Rochester
EDITORIAL STAFF
CARL B. DRAKE, Saint Paul, Editor
W. F. BRAASCH, Rochester, Assistant Editor
C. A. MCKINLAY, Minneapolis, Assistant Editor

Annual Subscription—$3.00.   Single Copies—$0.40
Foreign Subscriptions—$3.50.

The right is reserved to reject material submitted for editorial or advertising columns. The Editing and Publishing Committee does not hold itself responsible for views expressed either in editorials or other articles when signed by the author.

Classified advertising—five cents a word; minimum charge, $1.00. Remittance should accompany order.
Display advertising rates on request.
Address all communications to Minnesota Medicine, 2642 University Avenue, Saint Paul, or 324 Fourth Avenue South, Minneapolis. Telephones: Nestor 1381 and Dupont 1013.
BUSINESS MANAGER
J. R. BRUCE, Saint Paul
Volume 18   NOVEMBER, 1935   Number 11

Hay Fever in 1935

That the recent severe hay fever season was accompanied by an unusal number of unsatisfactory results from treatment is the common opinion of many of the doctors in the state. That this opinion is correct there is little question. The causes for the lack of good results are not easily found.

That this season was more severe than usual is unquestionable. A comparison of the pollen counts for the past five years, as carried on by A. O. Dahl of the Department of Botany at the University of Minnesota, shows that the concentration of ragweed pollen in Minneapolis was approximately 50 per cent heavier in 1935 than in any of the preceding years in which counts were made. The average maximum has been about fifteen hundred pollen grains per cubic yard of air. This year the maximum was twenty-two hundred. During the preceding four years the pollen concentration became high enough to cause symptoms on August 14, 15 and 16; this year the initial rise was on August 11. Usually the period when a large amount of pollen is present in the air lasts about three weeks, while this year this period was extended to four weeks. So the ragweed season began earlier, lasted longer and the pollen content of the air was as much as 50 per cent greater than usual.

Besides the factor of ragweed pollen itself, we are beginning to appreciate that fall hay fever is not a problem of ragweed pollen only, but that almost all hay fever sufferers are sensitive to other pollens, to specific dusts such as the animal danders, or to foods, and these may be the disturbing elements which prevent successful treatment.

To prevent the recurrence of such poor results as were obtained with too many patients this fall the following procedures seem to be indicated: more intensive treatment with ragweed pollen extract, especially during such a fertile summer as that just past; the addition of other pollens to which the patient is sensitive in inoculation; and the removal from the patient's environment, either physical or dietary, of other proteins which may cause the patient to have symptoms in spite of good ragweed desensitization.

H. M. SWEETSER, JR., M.D.

Part-Pay and Full-Pay Patients

Economic depression only serves to accentuate problems which are very real in the best of times. Free hospital care in tax supported institutions where the local profession donates its services has served to meet the problem of the care of the indigent in most localities. During hard times the load to hospital and staff is increased. To help lighten the load to the taxpayer some of the tax-supported hospitals in Minnesota have accepted part-pay patients who pay a nominal or very substantial part of the cost of their hospitalization, and the staff donates its services to this additional group. Such a patient is a pay patient as far as the hospital is concerned and charity as far as the profession is concerned. And the chances are that many of these part-pay hospital patients never know they are accepting charity from the doctors.

There should be no question as to the propriety of the attending physician's tendering a bill to a full-pay ward patient, even in a tax supported hospital. And yet we read that some of the larger hospitals of this type in Philadelphia have been in the habit of denying this right to the attending physicians in spite of a court action approving such procedure. To settle the controversy a joint committee, representing hospitals and profession, investigated the matter and decided to permit the attending physician to tender bills to full-pay ward patients up to a maximum of $25.00, with certain exceptions.

Of course the set-up in various localities differs. On the whole it does seem as though the attending physician should receive some compensation for his services to those who can pay something for hospital care.

"Throw-Away" Medical Magazines

The attention of the profession has been occasionally called, in the editorial columns of the *Journal of the American Medical Association,* to a type of magazine which is sent without charge to members of the medical profession, and it has been suggested that such magazines might well be thrown away—hence the term "throw-away magazine." These magazines are entirely commercial ventures and, while being commercial is not necessarily damning, there is usually a difference between a journal which is directed from a professional standpoint and one actuated from a commercial point of view. Such a journal depends entirely on advertising for its support, and its circulation, from the start, is what the owners wish to make it. Advertising rates are what the advertisers can be convinced the circulation justifies.

Some of these magazines contain only abstracts of medical articles which have appeared in medical journals—a duplication of the abstract departments of some of our national journals. Others contain articles emphasizing the economic side of practice and evidently are designed to undermine the policies of the organized profession.

One main objection to these parasitic magazines is that they afford an outlet for advertising proprietaries not acceptable to the Council on Pharmacy and Chemistry of the organized profession. This is decidedly against the best interests of medication in general.

If the throw-away magazines increase to any extent, it is conceivable that advertising in the regular medical magazines, which is essential to the publication of most medical journals, will suffer. It is felt in some quarters that even at the present time a deleterious effect is felt.

What is to be done about it? The most powerful weapon is public opinion in the profession. These magazines may either be thrown away or the publishers notified to discontinue mailing. The medical journals, too, may take united action, such as some have already done, by notifying these magazines to desist from abstracting their original articles.

While it is complimentary to MINNESOTA MEDICINE to have articles which have appeared in our columns republished in full or in abstract, credit being given the source of original publication, it is not so when it comes to the throw-away magazines. The original articles appearing in MINNESOTA MEDICINE are again to be copyrighted and the accompanying rights will be insisted upon in relation to throw-away medical magazines.

Rex Beach Writes Up Bonine

A recent issue of *Cosmopolitan* magazine carries an article by Mr. Rex Beach concerning the qualities of Dr. F. N. Bonine of Niles, Michigan, as a "famous benefactor of the blind" and a "Modern Miracle Man." In association with this article, *Cosmopolitan* magazine announces that "This article reflects the impressions of the author, and we publish it for its human interest value and not as carrying an endorsement." Dr. Bonine has apparently for years been doing a large business under the claim of dissolving cataract. Great numbers of people come to see him. They are charged $2 for the first visit and $1 for subsequent visits. The doctor practices in his shirt sleeves and the "miracles" are performed under circumstances which are calculated to impress by their simplicity. The usual method of treatment for patients with cataract is the prescription of eye drops which consist largely of boric acid and sodium salicylate in witch hazel water. There is not the slightest scientific basis for the claim that any cataract is benefited or removed by putting such drops in the eyes. Mr. Rex Beach and the *Cosmopolitan* are not rendering a service to mankind by their exploitation of so-called miracle men. They may cause a considerable number of sick people to spend money for transportation which might very well be spent in securing good medical care at the hands of competent physicians. Mr. Beach is himself hardly sufficiently trained in scientific medicine to have the slightest comprehension of the significance of testimonials or of the enthusiastic utterances of neighbors and friends in the villages which depend on the "miracle men" for such business as comes to them. (Jour. A. M. A., September 28, 1935, p. 1040.)

MEDICAL ECONOMICS

Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association

B. J. Branton, M. D.
J. A. Moga, M. D.
W. F. Braasch, M. D., Chairman
J. C. Michael, M. D.
A. N. Collins, M. D.

What Can I Do For My County And State Medical Society?

Suggestion Number Two

1. Read the synopsis of Wisconsin's new plan for care of patients in the indigent and low income groups.
2. Take part in the discussion of this plan and the policy back of it at the next meeting of your county society.

Would contracts for care of the indigent be desirable in your county? Or credit agencies medically controlled to assist low income patients? Talk over the medical economic situation in your county. Formulate definite policies looking to definite programs. Ask your State Office for help. It may be time for you to act.

What have you done about Suggestion Number One, printed in these columns last month?

Have you interviewed the coach of your local high school debating team?

Have you offered him the assistance of the Minnesota State Medical Association for additional material for his debaters?

Have you secured literature on the subject yourself?

Remember that you are going to see that a representative of your society has an opportunity to give the medical viewpoint at the conclusion of the debates.

President Roosevelt has said, according to a recent issue of the *Journal of the American Medical Association*, that *"there will be no program for compulsory health insurance until public sentiment has crystallized in that direction. In the crystallization of public sentiment much will depend on this nation-wide series of debates, which will influence not only the minds of the adults of the next generation but those of hundreds of thousands of persons who will listen to the debates as they are publicly presented in innumerable villages, towns and cities."*

High School Debates

Preparations are going forward for the 1935 Inter-Scholastic Debates among approximately 102 schools in Minnesota.

The subject (as repeatedly stated in these colums):

> **RESOLVED: that the Several States should enact legislation providing for a system of complete medical service available to all citizens at public expense."**

The list of schools that will enter this year is still incomplete but Mr. O. E. Smith, Anoka, director of the High School League, expects last year's 102 schools and perhaps a few others to enter.

At this time, therefore, it is particularly interesting to Minnesota physicians to note that high school debaters in Michigan will *not* debate on State Medicine.

Munitions in Michigan!

The subject selected by the National University Extension Association was proposed to Michigan educators just as it was to those in the 40 odd other states who participated last spring with this result:

Michigan high schools have for the subject of their interscholastic debate *"The Nationalization of Munitions!"*

It so happened that Prof. J. H. McBurney of the University of Michigan was one of the committee of five who phrased the proposition, too.

In Minnesota the subject had been accepted before the physicians were even aware that a meeting on this important question was to be held or that an opportunity might present itself to discuss the matter with local high school and college officials with a view to changing the subjects.

What About Minnesota?

Just what pressure was brought to bear in Michigan which led to dropping state medicine and substituting nationalization of munitions it would be interesting to Minnesota physicians to hear.

The fact that the Minnesota State Medical Association was not aware of these preliminary conferences at the University may well be taken as a serious reflection upon the organization's contacts with the high schools and colleges.

It emphasizes once again how important it is for our membership and the Auxiliary to keep in constant touch with all public activities.

If we had been more efficient in this respect we might have done as Michigan did.

The Doorbell Survey in Minnesota

The Health Survey, known popularly as the "doorbell census," will begin within a few months in Minnesota.

This is the survey of the amount and extent of chronic disease which is to be conducted under the auspices of the United States Public Health Service in 19 selected states this winter.

The survey will be financed under a special grant out of the funds of the WPA.

Assistant Surgeon General L. R. Thompson of the United States Public Health Service is directing the survey from its national headquarters at Detroit. His immediate assistants are Mr. B. St. John Parrot, formerly of the Milbank Fund, selected for an extensive experience with a variety of health surveys; also Mr. Clark Tibbets, who is likewise experienced in survey work having been employed on a number of government projects.

Bio-Statistician in Charge

The 19 selected states have already been divided into regions. The Great Lakes region of which Minnesota is a part, consists of Minnesota, Missouri, Illinois and Michigan. Its headquarters are in Chicago. Dr. A. W. Hedrich of Johns Hopkins University is regional director.

Dr. Hedrich, bio-statistician of Johns Hopkins University, has been loaned to the Public Health Service for the period of the survey which approximates six months.

As Minnesota newspapers and the *Journal of the American Medical Association* have already reported, five cities are to be selected for investigation in Minnesota. Four of them have already been determined. They are:

Minneapolis
Saint Paul
Willmar
Winona

A fifth will be announced later.

In each of the Twin Cities, 10,000 families will be enumerated. They will be so selected as to form a representative sample of the population. Smaller cities will be enumerated completely.

Minnesota Supervisor Selected

The enumerators who are to gather the information for the survey will be picked from the relief rolls. Only people who are well qualified for the task will be selected according to Dr. Hedrich, who spent some time in Minnesota making a preliminary investigation during October. Dr. Hedrich and the Health Service feel confident from experiences in other states that plenty of competent enumerators who will live up to their high standards for the work will be found on the relief rolls, individuals such as nurses, teachers, business women and the like.

The supervisor for Minnesota was just announced as this issue went to press. His name, according to press reports, is Kenneth E. Setre, of Minneapolis.

For each three enumerators there will be one office worker who will check and recheck the data submitted. These reports will then be sent to the Detroit headquarters where they will be edited and checked once more. After that, they will be ready for coding and interpretation by the statisticians.

The process of enumeration is expected to take about six months in Minnesota.

"Quality Not Quantity"

Quality not quantity is to be the watchword for all who have anything to do with the gathering of statistics according to Dr. Hedrich.

Every possible precaution will be taken to make the information accurate and of scientific value.

"Accurate information always leads to a constructive program," he observed in Minneapolis last week.

"It was not until the reasonably accurate statistics about the sickness and deaths among infants were provided by William Farr a century and a half ago in England that any constructive program was undertaken to cut down the infant death rate in the British Isles.

"All of our progress in public health has waited upon accurate information.

"No Statistics on Chronic Disease"

"There are no accurate statistics as to the amount of chronic illness and its relation to employment and to medical facilities. Such statistics are necessary before we can make any great progress in attacking the control of chronic disease with all its ramifications.

"This information is tied up in the questionnaire with essential economic data hitherto not generally available; data on race, age and sex with reference to disease, on the mobility of the population and the health hazards of mobile population groups.

"There is no specific objective in this Survey other than the assembling of scientific information for the use of any agency that may have need of it.

"We hope that the medical profession will make use of the information gathered. The job of improving health is principally theirs. We hope especially that it will assist the physicians to establish themselves further in the periodic health examination field. We have every reason to believe that the facts gathered will make very evident the importance of this phase of preventive medicine."

Physicians to be Questioned

As already noted in a recent issue of the *Journal of the American Medical Association,* enumerators will be required to ask for the name of the family physician or the hospital or clinic and the physician, hospital or clinic will be asked to confirm the diagnosis given to the enumerator at the door.

This obviously involves the possibility that physicians will be asked to divulge confidential information without the consent of their patients.

That such procedure might involve the doctor in a legal difficulty has been discussed by physicians themselves and suggested as a real difficulty in the conduct of this survey as now planned.

It is Dr. Hedrich's belief that a satisfactory way out of this dilemma will be arranged. Possibly it will be a system of keying by which only the physician himself will know to what patients the numbers or symbols refer.

A statement relative to the medical coöperation to be invited will be issued shortly by the Surgeon General of the Public Health Service.

Medical Profession Will Watch

Whatever may be the official purpose of this survey, *medical observers are well aware that the statistics thus secured will be eagerly examined by the proponents of sickness insurance for any additional supportive aid and comfort they may provide.*

Assuredly the medical profession is interested in any scientific effort to secure further information about the extent of crippling illness in the United States. Medical men will offer any possible legitimate aid and coöperation to this end.

At the same time they will be on the alert to prevent the accumulation of inaccurate, biased statistics on the extent and quality of medical services, which will in their turn be used to fasten unnecessary and harmful reforms of medical practice by Congressional act upon the people.

On Privileged Information

The legal aspect of this matter of privileged information is of especial interest in view of the preliminary plans reviewed above for the "doorbell" survey.

Mason's Minnesota Statutes refer to it as follows:

Section 9814, Chapter 92, contains the provision that a *physician may not disclose in a court action or proceeding as a witness, without the consent of the patient, any information or any opinion based thereon which he acquired in a professional capacity and which was necessary to enable him to act in that capacity.* The statute further provides that "no oral or written waiver . . . of the privilege shall be binding except that the same be made upon the trial or examination where the evidence is offered or received."

Another reference is found in Section 5707, Chapter 35. This section authorizes the State Board of Medical Examiners to refuse to grant a license to, or revoke the license of, "any person guilty of immoral, dishonorable or unprofessional conduct." The words "immoral, dishonorable or unprofessional conduct" as used in this section are defined to mean, among other things, *"willfully betraying a professional secret."*

Statutes Show State Policy

Nothing in the above statutes is directly applicable to a situation which will arise out of the "doorbell" survey if the present plans are carried through in Minnesota.

They have been interpreted, however, as showing the spirit of Minnesota law on the subject of privileged information.

Dr. W. C. Woodward, director of the Bureau of Legal Medicine of the American Medical Association, is of that opinion as the following quotation from his letter on the subject will indicate.

"While the very comprehensive law in force in Minnesota that prohibits the disclosure of professional secrets in courts without the consent of the party affected is not directly applicable to the situation described in your letter (concerning the position of the physician in the 'doorbell' survey), it may be accepted, I believe, as evidence of the policy of the state with respect to professional secrecy."

Ethics and "Secrecy"

In "Principles of Medical Ethics" of the American Medical Association, the ethical position of the physician is clearly defined in Section 1 of the chapter on duties of physicians to their patients.

This section says:

"Patience and delicacy should characterize all the acts of a physician. The confidences concerning individual or domestic life entrusted by a patient to a physician and the defects of disposition or flaws of character observed in patients during medical attendance should be held as a trust and should never be revealed except when imperatively required by the laws of the state. There are occasions, however, when a physician must determine whether or not his duty to society requires him to take definite action to protect a healthy individual from becoming infected, because the physician has knowledge, obtained through the confidences intrusted to him as a physician, of communicable disease to which the healthy individual is about to be exposed. In such a case, the physician should act as he would desire another to act toward one of his family under like circumstances. Before he determines his course, the physician should know the civil law of his commonwealth concerning the privileged communications."

Counting Sick Men

(Chicago Tribune)

An interesting lay-slant on the Health Survey as it is to be conducted in Chicago is worth noting in the following editorial that appeared in a recent issue of the *Chicago Tribune:*

"The New Deal in Therapy"

"At a cost of $125,000 to the tax payers, a house to house canvas is to be made in Chicago to discover the relationship of illness and unemployment. A member of the medical faculty of Johns Hopkins has been sent here to run the show. When it is all over we shall know that some people are sick because they are unemployed and other people are unemployed because they are sick. A few of the shrewder heads in the community had suspected some such relationship but it will be nice to have the suspicions confirmed with neat tables of figures. . . .

"Naive laymen have been assuming for a long time that the art of medicine is the art of healing the sick. Obviously they were wrong. "Don't cure 'em; Count 'em,' is the New Deal's latest contribution to the relief of pain and disease among the unemployed. Apparently it is better to spend $125,000 to count a hundred thousand sick people than to cure 5,000 of them.

"Perhaps these remarks are unjust. Maybe after a sick man has been counted and carefully questioned as to his middle initial and when he first began to have his headaches, he will feel a lot better. Maybe."

Hospital Week-Ends

From the *Detroit Medical News,* August 12:

"A recent newspaper dispatch joyfully reports that as a result of adoption of the Group Hospitalization Plan, New Yorkers have established a new custom, the hospital week-end. Subscribers to this plan pay an annual fee amounting to three cents a day and are thereby entitled to three weeks' hospitalization without additional cost. Having paid, they quite naturally expect their money's worth. Dr. J. F. Kimball, originator of the plan, hastens to add, however, that these visits are not for the purpose of recreation but to avoid loss of time from business. We do not deny that this may be true. The fact remains, however, that illnesses which are amenable to elective week-end treatment are hardly to be considered of importance from the standpoint of public health. . . .

"The Group Hospitalization Plan already illustrates, in its comparatively brief existence, one of the glaring developments of sickness insurance, namely, increased sickness. There can be no doubt that malingering and 'compensation neuroses' play the major part in the increasing incidence of illness under insurance systems. Moreover, any plan which encourages hospitalization for petty complaints will, in the aggregate, swell, rather than decrease, the cost of medical care. And this, at the moment, is the real object of socio-economic planning in medicine.

"Another and by no means the least pernicious feature of hospital insurance schemes is that they provide the potential entering wedge for state medicine. It is generally recognized that these schemes tend to widen in their scope. . . .

"The *New York Post* puts the matter plainly—'Rather than obviating the need for national health insurance, the three cent plan paves the way for it.'

"Is group hospitalization the wolf in sheep's clothing?"

Concerning Birth Control

Activities of the American Birth Control League and of its constituent unit, the Minnesota Birth Control League, have had a tendency of late to cast some misunderstanding upon the action taken by the House of Delegates of the American Medical Association on the subject of contraceptives.

Neither the American Medical Association nor the Minnesota State Medical Association has ever taken any action or made any declaration for or against birth control.

The resolution passed by the House of Delegates of the American Medical Association at Atlantic City last June called for the appointment by the Board of Trustees of a committee which should make a study of the ultimate effect of the use of contraceptives upon health and general welfare of the people. No more, no less.

Following is the complete text as it was passed of the resolution with its preamble which should make this stand quite clear to members of the Birth Control League.

To Study Effects of Contraceptives

The House of Delegates declares nothing in the following resolutions to be interpreted as a declaration or action either for or against birth control:

Whereas, Under the stimulus of large nonmedical groups, the general use of contraceptives is being advocated and encouraged despite the existing law, not only by the above mentioned groups but by commercial interests as well; and

Whereas, *The ultimate effect of these measures on the health and general welfare of the population of the United States is unknown if not questionable and should accurately and extensively be studied by the medical profession, in whose care the health of the people rests;* and

Whereas, The laws, both federal and local, governing the physicians in their advice to individual patients, where such advice is given as a therapeutic measure, seem to be complicated, not well understood and generally unsatisfactory and their interpretation difficult; therefore be it

Resolved, *That a special committee be appointed after due consideration by the Board of Trustees to study related problems and to present, at least a preliminary report to the House of Delegates of the American Medical Association at the 1936 Annual Session;* and be it further

Resolved, That the trustees be requested to appropriate the funds necessary to carry out the purposes of these resolutions.

The committee of the American Medical Association will meet shortly in Chicago and decide upon its program of study.

In the meantime medical men who are interested in the program and activities of the Minnesota league are being solicited to assist in League activities all over the state.

Four Clinics in Minnesota

Dr. Rae T. LaVake of Minneapolis was recently appointed state medical director for the Minnesota League according to News Letter No. 1, issued by the Minnesota Birth Control League September 10, this year.

It appears from this bulletin that Minnesota has only four Birth Control Clinics, two of them in Minneapolis, one in Saint Paul and one in Rochester. The number is very unsatisfactory to the heads of the League who compare Minnesota's four with Pennsylvania's twenty-five, California's thirty, and New York's thirty-five.

The Council Meets

Medical Defense

In accordance with a suggestion made by the Committee on Medical Economics and accepted by the House of Delegates in Minneapolis, a Medical Defense Committee was appointed at a special October meeting of the Council in Saint Paul.

Members are Dr. B. J. Branton, Willmar, member of the Committee on Medical Economics; Dr. W. L. Burnap, Fergus Falls, counsellor, eighth district, and Dr. W. H. Hengstler, Saint Paul, chairman of the Committee on Medico-Legal Affairs.

This committee will meet at stated times or at call of the chairman to discuss each malpractice case brought in this state against a member of the state association, to give advice to such member, if requested, and in general to assist in the conduct of his case.

Affiliate Membership

The new amendment to the Constitution of the state association, Article V, Section 4, which has to do with Affiliate Membership was changed as directed by the House of Delegates to make certain that nothing in the new ruling would invalidate any affiliate memberships now in good standing.

The complete amendment reads as follows:

> Affiliate members shall be those members of component medical societies:
>
> 1. Who, through disability, are unable to engage in the practice of medicine.
> 2. Who have retired from the practice of medicine.
>
> Provided, however, that such member in either class, shall have first, upon his own request, been declared an affiliate member of such component society at its regular meeting, such action having been approved by the Council, and provided, further, that such Affiliate Membership shall automatically cease and revert to its previous status upon the termination of the disability or upon resumption of practice.
>
> *Nothing in this section shall in any manner invalidate an Affiliate Membership in good standing at the time of the adoption of this amendment.*

Memorial

A memorial to the late Dr. Herman M. Johnson, to be placed in the Administration building at the University of Minnesota, was discussed by the Council. A committee was appointed to inquire into the possibilities for such a memorial and report to the Council at its next meeting.

What the Editors Say

Editorial comment occasioned by medical conventions is nearly always sympathetic and appreciative.

The following editorial comments appeared recently in the *Detroit News* and the *Detroit Free Press* respectively on the occasion of the meeting there. They are reprinted below in part for the interesting and significant points of view they reflect upon the part of the lay press.

Compliment to Doctors

Said the *News:*

". . . It is a compliment to the medical profession that we are amazed and indignant when doctors oppose social trends that would jeopardize their economic status. We have come to regard doctors as being primarily concerned with helping others."

For the Family Physician

From the *Free Press:*

"Naturally many things of consequence are being said at the convention sessions. But from the standpoint of general public interest nothing is likely to be more arresting than one of the remarks made by Dr. Charles H. Mayo at the opening meeting.

"Dr. Mayo prophesied the return of the family physician to his rightful place. 'The specialist will continue to have a place in society,' said Dr. Mayo, 'but the general practitioner who has been eclipsed by the specialist in the last decade is again coming to his own.'

Good News

"This is welcome news.

"We do not say so by way of minimizing the work or importance of the specialist. He is necessary and invaluable. He performs a service nobody else could give.

"But the overshadowing position the specialist has been occupying of late to the eclipse and discouragement of practitioners has not been good.

"The general practitioner also does a work, a most important one, that nobody else can perform.

"The competent family physician has a knowledge few specialists ever have a chance to acquire except in special instances.

"He knows his patients, their antecedents, background and mental and physical peculiarities. Often he knows their life history from babyhood. He can anticipate their reactions and their weaknesses and their immunities. He is their friend and father confessor.

"Study of a mere case history collected by a secretary is all a specialist often has in lieu of this; and it is a poor substitute.

"It would be a sad blow if specialists should disappear; and it would be an irreparable disaster if general practitioners were to die out.

"Both are needed but the second is fundamental."

New York's "Gradient Plan"

Notable among the many economic studies and experiments that are going on amoung county medical societies is the "Gradient Plan" proposed by the Medical Society of the State of New York.

For the purposes of this plan which is carefully worked out by a series of graphs people are divided into three groups: the "self-reliant"; the "partially self-reliant"; the "destitute."

A definite relationship is worked out between all welfare and health agencies and the medical profession for the care of each of these groups.

For the purposes of the diagram, definite lower limits of income are set to mark the "self-reliant" from the "partially self-reliant," and the latter from the destitute. The income figures, are, of course, based upon New York standards and are probably higher, therefore, than the same limits might be in the Middle West.

For Medical Banking

For the "self-reliant" and "partially self-reliant" groups who want to spread the cost of a major expense for health over a period of time, the New York committee suggests a new type of banking.

"The physician should be taken out of the banking business," says the committee. "He understands little or nothing about the functions of 'credit'; he has failed to use it for the betterment of either himself or the public."

On the other hand, bankers should be able to see readily the field of opportunity and service open to them in the provision of financial assistance for those who wish to spread the expense of major health and medical care over a period of income-time. With reasonable security and profit, millions of dollars could be put to work banking medical credits.

". . . The Federal Housing Act loans for house repairs, etc., have been extended to such needs as oil burners and ice boxes. Why should not the banking industry be given a like guarantee by our State or Federal government for financing health and medical credit needs?"

Minnesota State Board of Medical Examiners

"Rupture Expert" Warned Against Operating in Minnesota

Re: Mr. H. M. Shevnan, 6538 Talman Ave., Chicago, Ill.

The Minnesota State Board of Medical Examiners has issued a warning to Mr. H. M. Shevnan who advertises himself as a rupture shield expert, to refrain from operating in the State of Minnesota. Mr. Shevnan is not registered under the basic science law and neither is he licensed to practice medicine in the State of Minnesota. Mr. Shevnan had advertised in a number of southern Minnesota newspapers that he would be at the Saulpaugh Hotel at Mankato on September 24 and 25. The matter was referred to Mr. Brist who called upon Mr. Shevnan at Mankato. The law was explained to Mr. Shevnan and he stated that he would refrain from continuing his activities in this state, rather than have the matter taken into court. Mr. Shevnan stated that he originally planned to make stops at Albert Lea, Faribault, Winona and St. Cloud. He stated that he would cancel these arrangements and return to Chicago.

The State Board of Medical Examiners respectfully requests that it be notified at 524 Lowry Medical Arts Bldg., St. Paul, in the event any advertisements appear anywhere in the State of Minnesota indicating that Mr. Shevnan has returned or will return to this state.

Butterfield "Bone-Setter" Pleads Guilty at Fairmont

Re: State of Minnesota *vs.* Heppner

Peter D. Heppner, fifty-one years of age, who for a great number of years has resided on a farm two miles from Butterfield, Minnesota, entered a plea of guilty to an information charging him with practicing healing without a basic science certificate, on October 15, 1935, before the Honorable Julius E. Haycraft, Judge of the District Court at Fairmont, Minn. The complaint against Heppner was filed by Mr. Brist on behalf of the Minnesota State Board of Medical Examiners.

Heppner, since 1922, has represented himself as a "bone-setter." He has no medical education whatsoever and has been engaged in farming for the past thirty years. In 1934, following an investigation conducted by the Minnesota State Board of Medical Examiners, Heppner was warned to refrain from practicing healing in any manner in the State of Minnesota. Subsequently, he attempted to secure a license from the Medical Board to practice massage. He was unable to qualify and was denied the right to take the examination. The investigation disclosed that Heppner was operating on Monday and Tuesday of each week at the Edgewater Hotel at Fairmont. In his room were found numerous bottles, ointments, a cupping and bleeding apparatus and a device for giving electrical treatments. Heppner's patients paid him $1.00 for each treatment by leaving the money on the dresser in his room. In this manner, Heppner thought that he was immune from prosecution. After the facts had been presented to the Court, Judge Haycraft sentenced Heppner to a term of three months in the Martin County jail, ordered him to refrain from practicing healing in any manner in the State of Minnesota, and placed him on probation with instructions to report to the Court at the opening day of the March term. Judge Haycraft admonished Heppner to comply with the laws of this state in every respect, and told the defendant that unless he did so he would find himself in the county jail on very short notice.

Mr. C. L. Erickson, who is serving his first term as county attorney of Martin County, gave every assistance to the Board in the prosecution of this case.

Check Forgers Posing as Physicians Sentenced to Prison

Re: Edward Coats, alias Dr. Edward Coats, alias Edward W. DePuew, alias Edward W. DeCoatis, alias Edward LaRue, alias George Hall.

Re: Harry T. Workman, alias, Dr. L. E. DuBois.

Edward Coats

Harry T. Workman

The State Board of Medical Examiners wishes to advise the medical profession that two check forgers, who operated in St. Paul last spring and posed as doctors, have been apprehended and sentenced to prison. The check forger who posed as "Dr. Edward Coats" was sentenced on October 3, 1935, at Wichita, Kansas, to three years in the Federal penitentiary for forgery. At the time of his arrest, Coats was on parole from the Michigan state prison at Jackson, Michigan, where he had served time for forgery. He also had narcotics in his possession at the time of his arrest by the Wichita police. Coats is wanted at Newton, Kansas, for passing checks and also in St. Paul.

The fake doctor who passed five forged checks in St. Paul in the month of April, 1935, under the name of "Dr. L. E. DuBois," was arrested in Cleveland, Ohio, and sentenced, on July 27, 1935, to an indeterminate term in the Ohio state prison, at Columbus. This faker passed a check at the Alverdes restaurant, the Florsheim shoe store and at three other places while in St. Paul.

At the time these men were operating in St. Paul, inquiry was made to the Medical Board by several persons, who had cashed these checks, as to whether these men were licensed to practice medicine in this state. Upon being advised that they were not licensed, they got in touch with the St. Paul police department. The Medical Board wishes to express its appreciation for the fine work done by Detective Lieutenant Frank J. Mondike, and his assistant, George I. Heim, of the St. Paul police, Check and Forgery Division. These men assisted in every way in locating these forgers and we quote Detective Lieutenant Mondike:

> "We intend to be bad medicine for fake doctors who operate in this city with forged checks."

The Medical Board solicits the coöperation of every member of the medical profession in immediately notifying the Board if any individuals representing themselves as doctors are passing worthless checks in their community.

Osage Iowa Quack Pleads Guilty at Albert Lea

Re: State of Minnesota *vs.* Henry H. Koller, alias "Prince Rudolph," alias "Dr." Koller.

Henry H. Koller, sixty-five years of age, formerly of Osage, Iowa, entered a plea of guilty, on October 10, 1935, to a charge of practicing healing without a basic science certificate before the Honorable Norman E. Peterson, Judge of the District Court at Albert Lea.

The State Board of Medical Examiners ordered an investigation of this man's activities following a report that Koller was practicing at the St. Charles Hotel, in Albert Lea. The investigation disclosed that Koller had been in Albert Lea, about a month prior to his arrest on October 5, and that he was representing himself to the people as Dr. Koller, specializing in eye, ear, nose and throat. Koller, claiming to be a descendant of Austrian nobility and the right to be addressed as Prince Rudolph, is neither registered under the basic science law of Minnesota, nor is he licensed to practice medicine. The investigation disclosed that Koller has the following record:

February 24, 1925, Koller was fined $100.00 and costs of $6.20 at Osage, Iowa, on a charge of practicing medicine without a license. Koller was giving electrical treatments and furnishing pills and had charged a patient $140.00 for two weeks treatment.

May 12, 1925, Koller pleaded guilty, at Osage, Iowa, to a charge of rape committed on a seventeen-year-old girl from Mower County, Minnesota, and was sentenced to a term of not to exceed ten years at the Iowa state prison at Fort Madison. April 23, 1930, he was released from prison.

February 26, 1931, Koller pleaded guilty to a charge of "resorting to a hotel for the purpose of prostitution and lewdness." Koller had left the state of Minnesota with the wife of a man from Martin County, and was apprehended at McIntire, Iowa, and sentenced to serve not to exceed five years in the Iowa state prison at Fort Madison. March 16, 1934, he was released from prison.

March 5, 1935, Koller was permanently enjoined from practicing medicine in the state of Iowa.

March 6, 1935, Koller's license as an optometrist in the state of Iowa was revoked.

Upon being questioned, Koller admitted having been declared insane, but that the finding was reversed by the District Court of Iowa. Following the presentation of all these facts to the Court, Judge Peterson imposed a sentence of six months in the county jail of Freeborn County. Judge Peterson told the defendant that he was no credit to the community and ordered him escorted to the Iowa state line. This was done because Koller is not a resident of the state of Minnesota, and had been a public charge of Mitchell County, Iowa, for four months previous to coming to Albert Lea. The Court forbade the defendant to practice healing in any manner in the state of Minnesota, and further informed him that if he returned to this state he would have to serve this jail sentence. Koller was immediately returned to the authorities at Osage, Iowa.

The State Board of Medical Examiners wishes to express its appreciation for the prompt and efficient coöperation shown in this case by Chief Miles Norton of the Albert Lea police department, Sheriff Helmer C. Myre of Freeborn County, and County Attorney Elmer R. Peterson.

Pyrethrum Ointment

An ointment containing an extract from powdered pyrethrum flowers (Chrysanthemum cinerariæfolium). The extract is obtained by treating powdered pyrethrum flowers with a hydrocarbon oil of the kerosene type; this extract is then incorporated into an ointment base composed of hydrous wool fat, petrolatum and paraffin. The finished product contains 27 per cent of the active extract and 73 per cent of ointment base. This product has been shown to be an effective agent in the treatment of scabies, and except in rare instances it does not produce dermatitis with resultant exfoliation. Upsher Smith Company, Minneapolis.

Can the Leopard Change Its Spots?

The "patent medicine" interests have decided that another housecleaning is called for. In August, 1934, there was published in the *Editor and Publisher* an article entitled "Proprietary Association Begins Clean-Up." In this it was stated that the Proprietary Association—the present name for the organized "patent medicine" interests—had created an Advisory Committee on Advertising, which would draw up an "Outline of Ethical Practices in Proprietary Advertising." In June of this year the New York *Times* reported that the Proprietary Association was about to "launch a comprehensive program of research." The same article stated that Dr. Frederick J. Cullen (formerly Chief of Drug Control of the Department of Agriculture), general representative of the Proprietary Association, was also serving, ex officio, as secretary. There has recently been issued (August 28, 1935) what is presumably one of the first pieces of work in this field. In April, 1933, the Department of Agriculture issued under Dr. Cullen's name a bulletin warning the public against the coated laxatives that contain phenolphthalein. Now the Proprietary Association, under Dr. Cullen's name, sends Bulletin 6365 to all its members, in which Dr. Cullen states that the government bulletin (April, 1933) issued by him was based on information gathered from medical textbooks and from a report made by a physician in one of the medical journals (the report of the case of a small child who ate a complete box of the "candy laxative" known as "Ex-Lax" and promptly died). It appears that Dr. Cullen today has decided, "a more exhaustive study of the effects of phenolphthalein since the issuance of that article has resulted in a change in my opinion as to its harmful effects." Undoubtedly the "patent medicine" interests are on the defensive and presumably will spare no expense to convince a gullible public that its business is a public-spirited activity. But those who have followed critically the devious methods of the "patent medicine" business for more than a quarter of a century may be excused for holding to the well established opinion that the leopard does not change its spots. (Jour. A. M. A., September 21, 1935, p. 971.)

OF GENERAL INTEREST

Dr. C. E. Johnson, formerly of Cambridge, has recently located at Pine River.

* * *

Dr. M. Hansen of Ada has recovered from a severe case of erysipelas contracted in August.

* * *

Dr. Herbert Davis, Saint Paul, is rapidly recovering from a gallbladder operation performed at Rochester.

* * *

Dr. L. Gordon Samuelson of Mankato recently bought the beautiful home of Clifford Babcock on Oak Knoll.

* * *

Dr. A. J. Wentworth, who has been absent from the Mankato Clinic for one year, will return the first of November.

* * *

Dr. George Bohl of Ada was a member of the group of Great Northern surgeons that met at Glacier National Park in July.

* * *

Dr. Thomas H. Dickson was recently appointed Medical Director of the Minnesota Mutual Life Insurance Company to succeed Dr. C. N. McCloud.

* * *

Dr. Theodore Loken of Ada, a recent benedict, attended a course of instruction in September at the Cook County Graduate School of Medicine in Chicago.

* * *

Dr. E. D. Greenberger, who has been taking Dr. A. J. Wentworth's place in the Mankato Clinic, will go to McAlister, Oklahoma, to take over an x-ray practice.

* * *

Dr. and Mrs. A. J. Button of Pine River returned recently from a trip to the Pacific Coast, visiting en route Glacier and Yellowstone Parks, Seattle and Portland.

* * *

Dr. James T. Priestley of the Mayo Clinic gave an address Monday, October 28, before the Blue Earth County Medical Society. His subject was "The Surgical Treatment of Peritonitis."

* * *

Dr. Kenneth E. Bray, son of Dr. C. W. Bray of Biwabik, and a graduate of the University of Minnesota, 1934, has joined Dr. A. T. Laird's staff at the Nopeming Tuberculosis Sanatorium.

* * *

Dr. W. S. Middleton of Madison, Wisconsin, Dean of the Medical School, was the guest speaker before the Saint Luke's Hospital staff, Duluth, at its regular September meeting. He discussed oxygen therapy.

* * *

Dr. Charles B. Wright, Minneapolis, has been appointed a member of the Editing and Publishing Committee of the Minnesota State Medical Association to fill the vacancy due to the illness of Dr. A. S. Hamilton.

* * *

Dr. Adolph M. Hanson, Faribault, Minnesota, addressed the Minneapolis Clinical Club, October 10, on "Some Aspects of the Thymus and Pineal Problems." Honorary membership in the Minneapolis Clinical Club was conferred upon Dr. Hanson at this meeting.

* * *

Superintendents Sister M. Patricia of Saint Mary's Hospital and James McNee of Saint Luke's, Duluth, attended the sessions of Hospital Administrators and the American Hospital Association, late in September, at Saint Louis.

* * *

Correction.—In the article entitled "Pathologic Conditions in the Newborn" by Thomas Mayers, M.D., which appeared in the October, 1935, number of Minnesota Medicine, the illustrations for Figures 1 and 2 (page 659) are reversed. The legend for Figure 1 as it appeared in the journal applies to Figure 2, and vice versa.

* * *

Much progress has been made in Norman County in the immunization of school children against smallpox and diphtheria. Vaccination clinics were held May 18 in Twin Valley, Ada and Halstad when more than 2,200 children were vaccinated. The state furnished the toxoid, county organizations supplied funds for the vaccine, and the doctors did the vaccinating for nominal fees.

* * *

Norman County has handled its own relief cases for the past two months. The local medical group has had cheerful coöperation from the relief authorities. The doctors have always done their best to keep their pations on the "pay their own bills" schedule whenever possible, knowing full well that those who pay something, however small, are better patients than those who pay nothing.

* * *

Dr. Fred G. Carter, superintendent of Ancker Hospital, Saint Paul, since December, 1924, will leave November 15 to accept the position of superintendent at Christ Hospital in Cincinnati. It is understood that Dr. S. R. Lee, formerly an assistant to Dr. Carter, but at present superintendent of the state asylum at Willmar, will succeed Dr. Carter.

* * *

The Northwestern Clinic at Crookston celebrated its fifteenth anniversary October 10, 1935. A banquet was served at the Hotel Crookston for the staff, employees, and wives of the physicians. The Clinic was opened in 1920 by Drs. M. O. Oppegaard and O. E. Locken, together with Dr. C. D. Mitchell, dentist. Members added to the staff since that, and now associated in practice, are Drs. C. L. Oppegaard, L. L. Brown, and W. F. Mercil. The Clinic employs a total of fourteen at present.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for November

The Minnesota State Medical Association Morning Health Service.

The Minnesota State Medical Association broadcasts weekly at 11:15 A. M. every Tuesday over Station WCCO, Minneapolis and St. Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month will be as follows:

November 5—Socializing Children.
November 12—Heart Murmurs.
November 19—Digestive Complaints.
November 26—Functions of the Teeth.

State Association Meeting

The Committee on Scientific Assembly for the 1936 annual meeting of the Minnesota State Medical Association held its first meeting of the year at the Nicollet hotel in Minneapolis, Saturday, October 26.

Members of this committee are: Dr. W. W. Will, Bertha, president elect of the state society, chairman: Dr. Gordon B. New, Rochester and Dr. T. H. Sweetser, Minneapolis, chairman and secretary, respectively, of the Surgical Section; Dr. F. J. Hirschboeck, Duluth, and Dr. C. N. Hensel, St. Paul, chairman and secretary, respectively, of the Medical Section; Dr. W. A. O'Brien, Minneapolis, chairman of Clinical Demonstrations; Dr. E. G. Bannick, Rochester, chairman and Drs. E. H. Rynearson, D. L. Wilbur, H. K. Gray and J. T. Priestley, members of the Local Arrangements Committee, and Dr. E. A. Meyerding, St. Paul, secretary of the association.

The 1936 meeting will be held at Rochester, May 3, 4, 5 and 6.

Following the Saturday night meeting, members of the above committee issued an invitation to all members of the Association who wish to present papers at the annual meeting to send their names at once to the Secretary's office, 11 W. Summit Ave., St. Paul. The committee will hold its next meeting early in December.

Sixth Councilor District Meeting

Several hundred medical men from the sixth councilor district, including members of the Wright County, Stearns-Benton, Red River Valley, Clay-Becker, Kandiyohi-Swift-Meeker and East Central Minnesota Medical Societies together with all officers and committee chairmen of the state association will attend an important councilor district meeting to be held at St. Cloud, November 21.

Dr. Morris Fishbein, Chicago, editor of the *Journal of the American Medical Association,* will be the principal speaker at this meeting which is to be held in honor of President-elect W. W. Will, Bertha, of the Minnesota State Medical Association and Dr. E. J. Simons, Ah Gwah Ching, newly elected councilor of the district.

There will be a dinner for the physicians at the St. Cloud hospital to be followed by a meeting at the Assembly rooms of the Technical High School. Members of the Women's Auxiliary, dentists, druggists and her interested persons will be invited to attend this latter meeting. On the program, beside Dr. Fishbein, are Dr. C. B. Wright, of Minneapolis, trustee of the American Medical Association, and Dr. J. A. Myers, Minneapolis, Professor of Preventive Medicine at the University of Minnesota and Dr. S. A. Slater, Worthington, director of Southwestern Sanitarium.

On the same evening Dr. Fishbein and Dr. Myers will also address a public health meeting to be held jointly by the Stearns County Public Health Association and the Minnesota Public Health Association in the Auditorium of Technical High School.

Rice County Society

Dr. Leo G. Rigler of the University of Minnesota addressed the Rice County Medical Society at a meeting held in the Faribault Clinic rooms at Faribault, Wednesday, October 9, at 7:45 p. m.

Dr. Rigler's subject was "The Development of the Use of Opaque Medica in Roentgen Diagnosis."

The program also included reports by Dr. F. J. Lexa and Dr. S. B. Haessly on the last state session and on the bureau of collections, respectively.

Upper Mississippi Society

The Upper Mississippi Medical Society held their regular meeting October 17, 1935, at the Commercial Hotel, Wadena.

Following a 6 o'clock dinner the members were addressed by Dr. W. W. Will, President of the State Medical Association, and Dr. H. S. Diehl, Dean of Medical Sciences, University of Minnesota. Dr. C. B. Wright, Minneapolis, read a paper entitled "Abdominal Symptoms of Heart Disease," and Dr. Theodore Sweetser, Minneapolis, spoke on "Hydronephrosis, Diagnosis and Treatment."

BUY CHRISTMAS SEALS
CHRISTMAS 1935
FIGHT TUBERCULOSIS

BUY CHRISTMAS SEALS
CHRISTMAS 1935
FIGHT TUBERCULOSIS

BUY CHRISTMAS SEALS
CHRISTMAS 1935
FIGHT TUBERCULOSIS

WOMAN'S AUXILIARY

Mrs. F. J. Elias, *President*, Duluth, Minn.
Mrs. L. W. Barry, *Editor, Press and Publicity*,
2193 Sargent Ave., St. Paul, Minn.

The first meeting of the new board of the Women's Auxiliary to the Minnesota State Medical Association was held Tuesday, October 8, 1935, at the home of Mrs. F. J. Elias, State President, at Duluth, Minnesota, twenty-four members being present. The budget was discussed and approved, and appointments of committee chairmen were ratified.

Dr. W. A. Coventry, president of the Minnesota State Medical Association, reviewed the social problems of the day as they affect the practice of medicine.

Mrs. Florence Fitzgerald, from the office of the State Medical Association, spoke on the 1935 High School Debate, the subject of which is:

> Resolved: That the several states should enact legislation providing for a system of complete medical service available to all citizens at public expense.

The Board of the Auxiliary voted to coöperate with the doctors of the State of Minnesota in disseminating information on this subject, and to adopt it as one of the major projects of the year.

The Board also voted to coöperate with the Minnesota Public Health Association in sponsoring the annual high school radio contest held in connection with the 1935 Christmas Seal educational campaign. The subject for this year's talk is "Fight Tuberculosis with Modern Methods." Every Junior and Senior high school in Minnesota is eligible to enter one student's manuscript which has previously been delivered in public by the author. The contest will close November 23, and daily broadcasts over WCCO of the ten winning talks will begin about December 10. A committee of doctors and public speaking experts will serve as judges.

The State Auxiliary will again present the awards for the contest, including engraved gold medals to each student chosen to broadcast his talk, and a specially designed radio plaque to the school whose student wins first place in the broadcasting. Several counties have presented an award to the winner of the contest in their county, and plan to do so again. Ramsey County donated a loving cup to the winner last year, and Hennepin County offered the choice of a watch or two weeks at camp as its award to the winner in Hennepin County.

For the first time this year special prizes are being offered the schools which put on the best educational campaign on tuberculosis in the local preliminary contest. These include equipment to be awarded to the manual training department of the two schools judged best.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

The Pathology of Internal Diseases. Second Edition. William Boyd, M.D., M.R.C.P., Ed., F.R.C.P., etc., Professor of Pathology, University of Manitoba, Pathologist to Winnipeg General Hospital, etc. 904 pages. Illus. Price, cloth, $10.00. Philadelphia: Lea & Febiger, 1935.

Diseases of the Nose and Throat. Charles J. Imperatori, M.D., F.A.C.S., Professor of Clinical Otolaryngology, New York Post-Graduate Medical School, Columbia University, and Herman J. Burman, M.D., Instructor of Clinical Otolaryngology, New York Post-Graduate Medical School. 723 pages. Illus. Price, cloth, $7.00. Philadelphia: J. B. Lippincott Company, 1935.

APPARATUS ACCEPTED. By the Council on Physical Therapy of the American Medical Association, 1935.

Minnesota Medicine has received from the American Medical Association a small pamphlet containing a list of the apparatus accepted by the Council on Physical Therapy, the first one published under the direction and supervision of the Council. In addition to the list and description of accepted apparatus, the pamphlet contains indications for the use of each type and a statement relative to efficacies and dangers.

This pamphlet is a real contribution on the part of the American Medical Association in behalf of rational therapeutics—an effort to help place physical therapy on a sound, scientific basis for the benefit of the medical profession.

One of the purposes of the Council on Physical Therapy is to protect the medical profession, and thereby the public, against inefficient and possibly dangerous apparatus and against misleading and deceptive advertising in connection with the manufacture and sale of devices for physical therapy.

Apparatus Accepted includes all the devices accepted by the Council prior to May, 1935. Any physician can obtain this pamphlet free by writing to the Secretary, Council on Physical Therapy, A. M. A., 535 North Dearborn Street, Chicago, Illinois.

Hall & Anderson

PRESCRIPTION PHARMACY
BIOLOGICALS
PHYSICIANS' SUPPLIES

SAINT PAUL, MINN.
LOWRY MEDICAL ARTS BUILDING
TELEPHONE: CEDAR 2735

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society.

Volume 18 DECEMBER, 1935 Number 12

SOME OF THE NEWER DEVELOPMENTS IN HYPERTHYROIDISM AND HYPERPARATHYROIDISM*

FRANK H. LAHEY, M.D.

Boston, Massachusetts

I WISH to present to you some of the newer aspects of thyroid disease and hyperparathyroidism. I wish to present, also, some of the clinical aspects, particularly of hyperthyroidism in relation to some of the practical problems with which we have had to deal.

In order that you may know that we have had sufficient experience from which to draw deductions, I wish to mention that we have now operated on 13,790 patients with goiter with an operative mortality of 0.68 per cent, and a patient mortality of 0.87 per cent. Of that group, 4,521 have been exophthalmic with an operative mortality of 0.63 per cent, and 407 recurrent hyperthyroidism with a case mortality of 0.74 per cent.

I am extremely anxious that everyone who is dealing with thyroid conditions should appreciate what nearly everyone does, that the mortality rate in toxic adenoma is and always will be, I believe, considerably higher than in the more striking group, that is, exophthalmic goiter. I think this is due to the fact, not that toxic adenoma is any more serious as relates to its degree of hyperthyroidism, but rather because it tends to occur in people of middle age or advanced years, and so with coincident lesions.

I wish to present a group of cases, the management of which settles whether or not these patients will live or die. I have discussed these cases a good many times, but due to the fact that many physicians who are not dealing with acute thyroid states may go through their entire lives without seeing more than a few of these cases, I am prompted to repeat our experiences with so-called thyroid crises.

I wish you would all try to have the picture of a patient in a severe crisis in mind so that you can compare it with another picture showing the end-result after operation and then I think you will fully realize what hyperthyroidism is. We tend to think of hyperthyroidism in terms of toxicity. I think it is very much better if we think of hyperthyroidism in terms of hypercombustion.

While I cannot prove it, it is my conviction, from having the opportunity to see a good many of these patients in thyroid crises die unoperated, that thyroid deaths very likely are largely liver deaths. There are a number of things which make me believe that the serious conditions arising from severe hyperthyroidism are the result of diminished liver function. For instance, we know that when patients have a severe hyperthyroidism, going on to mortality, they often die jaundiced, even though they have had no surgical operation and no evidences of infection. They often die with excessive elevations of temperature (105 and 106 degrees); likewise, with no infection. We know they are benefited by the things that benefit patients with lowered liver tolerance, such as fluids, glucose, and transfusion. In addition to that, we know that when they do die they have a low glycogen in their liver.

Hyperthyroidism, in extreme states, that is, thyroid crises, is very much like diabetic coma. If we know a patient is going into a diabetic coma and do the right thing, we can keep him out of the coma. If he gets into the coma, he is difficult to manage. If we know a patient with excessive hyperthyroidism is going into a crisis and we recognize it, we not only can keep him out of the crisis but can operate upon him within three weeks and cure him entirely of his hyperthyroidism, with no danger of his going into a crisis again.

---

*Read before the annual meeting of the Minnesota State Medical Association, Minneapolis, June 24, 1935.

Therefore, it is important to have in mind, in a case of hyperthyroidism, what the signs of an impending crisis are. If you have a patient with a pulse of 120 in hyperthyroidism, and for an unknown reason the pulse progressively rises, that patient is a candidate for a crisis. If you have a patient with a clear mental state, who shows signs of irrationality, that patient is on the verge of a crisis. If you have a patient who has a superimposed infection, that patient is on the verge of a crisis because hyperthyroidism is intensified by infection exactly as diabetes is. Therefore, a patient with moderate to moderately severe hyperthyroidism, who is subjected to an infection, can very well within an extremely short time go into a severe crisis, become unconscious and die. If you have a patient with hyperthyroidism who is vomiting, that patient is on the verge of a crisis, because he has lost his sole method of balancing his metabolism. He has lost his ability to take in fluid and fuel, and so his increased metabolism goes on and he consumes himself because he cannot supply the fluid and fuel to combat his excessive metabolism. This is likewise true of the patient with hyperthyroidism who has diarrhea. In the event any of these conditions exist, a patient with severe hyperthyroidism is on the verge of crisis.

If you do the right thing you can get him out of the crisis, and that is to give him something to burn instead of himself. Give him salt solution, glucose, intravenous iodine, and sedatives. Give him salt solution, but not one thousand cubic centimeters in the morning, at noon, in the afternoon, and at night, because his metabolism is so excessively elevated he will burn that up quickly and there will be an interval in which he is burning himself. Tie a needle into his long saphenous vein, at the instep of his foot. Give him forty to sixty drops per minute of salt solution and five per cent glucose solution. Give it to him constantly day and night so he gets forty to sixty drops every minute. In the majority of cases you will need to give him concentrated glucose in addition. If you will do this and add, what we have discovered in the past five years you will need to use, 500 to 800 grams of glucose in solution, you will get most of these patients out of crisis. Contrary to the usual surgical teaching, which is never to operate on a patient close to crisis, we have always said, "Operate on the patient after you have gotten him out of crisis." If you get this patient out of crisis and send him home, you have only temporarily interrupted his excessive metabolism. He can very well go back into crisis, and the next time you may not be able to get him out. Having gotten him out of the crisis, put him on a high carbohydrate diet for about three weeks and you can do a hemithyroidectomy and promptly check the progress of his disease.

There has been developed within the last two or three years a measure concerning which you will probably begin to hear reports, and that is the so-called impedance angle. I do not wish to spend much time on the impedance angle, except to relate to you what the impedance angle is and our results as far as the accuracy of the impedance angle goes in diagnosing hyperthyroidism, so that you will be able to comprehend what it is all about when it begins to appear in the literature.

It has been known for a long time that when patients have hyperthyroidism they have an increased tissue porosity to an electric current, and when they have hypothyroidism they have a decreased tissue porosity to an electric current. Therefore, one may, if it is possible to measure this, diagnose hyperthyroidism in terms of tissue permeability, and the impedance angle is the relation of the effect of an alternating current in terms of resistance to capacity. It is what is spoken of by electrical engineers as the power factor. It can be determined on a patient by immersing his arms in salt solution, leading them to the apparatus, and by means of a bridge, tuning the resistance to a twenty-thousand alternating current.

I am not a physicist, and I am not capable of discussing this test from the point of view of its technical side. We have, however, with the aid of Professor Harrison, a physicist, now done this test on something over two hundred and fifty cases, and in this small series reported here the error in patients with cases of hyperthyroidism has been 29 per cent, and the error in non-toxic cases has been 15 per cent. I can only say that, in the frank cases of hyperthyroidism that you and I could diagnose clinically, this is accurate. In the borderline cases it is not yet dependable.

Another group of cases in which rather new developments have occurred are those related to exophthalmos. Everyone who is interested in thyroid disease is familiar with the fact that exophthalmos follows two thyroid states, but those who are not particularly interested in following thyroid disease are unaware of the fact that in many cases exophthalmos is not associated with hyperthyroidism but is particularly associated with postoperative hypothyroidism. In fact, one may have a patient with exophthalmic goiter who does not have exophthalmos. That patient may be operated upon, develop postoperative myxedema, and then develop an exophthalmos which is more intractable than the exophthalmos associated with exophthalmic goiter.

The covering of the eye is nourished by osmosis and not by blood vessels. Lid pressure produces wrinkling of the conjunctiva, it produces loss of nutrition which results in slough, and if it is permitted to go on it will result in complete loss of both eyes. Therefore, one should appreciate that every patient with extreme exophthalmos is a candidate for blindness, and if they do have progressive exophthalmos, something should be done about it, and done quite promptly.

If a patient has conjunctival wrinkling, the first thing that should be done is to suture the eyelids together. The edges should be denuded, just as the perineum is denuded, and they should be sutured while something is being done about taking care of the exophthalmos. If this does not relieve the exophthalmos, something must be done to produce regression of the prominent eyes. This is best done by means of an operation described by Howard Naffziger, of San Francisco, consisting of a brain operation, turning down a parietal bone flap, lifting up the frontal lobes and rongeuring away the roof of the bony orbital canal. This gives room for the enlarged ocular muscles to bulge upward and allows the eyes to sink back and thus protects them against lid pressure.

Dr. Horrax, in the Department of Neurosurgery in the Clinic, has operated now on six patients for this condition, and our conclusion is that it will save the eyes in every case, but it is not a cosmetic operation in terms of completely overcoming exophthalmos.

I am a little self-conscious in presenting this next subject because it has been discussed over the country a great deal, and I have purposely withheld statements regarding the value of total thyroidectomy for cardiac decompensation and angina until we should have had enough personal experience with it.

We have now operated on thirty-five patients, and our follow-up shows that the anginas have done better in terms of end-results than the cardiac failures. Our sum total experience in the thirty-five cases leads us to believe that complete thyroidectomy, total removal of the thyroid, for cardiac decompensation, promises not to be as satisfactory as we had hoped it would be. If you have a patient who has little or no cardiac reserve, you must create an artificial one by lowering his blood velocity and heart metabolism by producing myxedema. If you produce myxedema, you produce an inefficient heart. Therefore, those who have advocated this method have proposed that having produced a complete myxedema, you then feed them thyroid extract and maintain metabolism at minus twenty-five. We feel this is too narrow a lane to maintain over a long period of time, and our experience has been that in the total thyroidectomies for cardiac decompensation most of them have had a return of their decompensation. It is not as satisfactory an operation as is subtotal thyroidectomy in the patient with cardiac insufficiency associated with hyperthyroidism.

When the patient has an intolerable pain with angina pectoris, that patient will willingly accept the vegetative state which is associated with myxedema, and in those cases there have been a definite number who have been relieved of their pain. Still we do not feel entirely convinced that even in angina, total thyroidectomy will give the results we hoped it would. We believe we should not condemn total thyroidectomy but we believe patients should be carefully selected and, in the majority of cases, it will not prove as satisfactory as we hoped it would.

I am interested in presenting to you our experiences with blood cholesterol. Dr. Hurxthal in the Clinic has determined the blood cholesterol on 1,800 patients, and I would like to present the results of his experience. The range of normal blood cholesterol is 120 to 220 milligrams, per 100 c.c. of blood, and the average is 180 milligrams. The usual range is 160 to 200 milligrams.

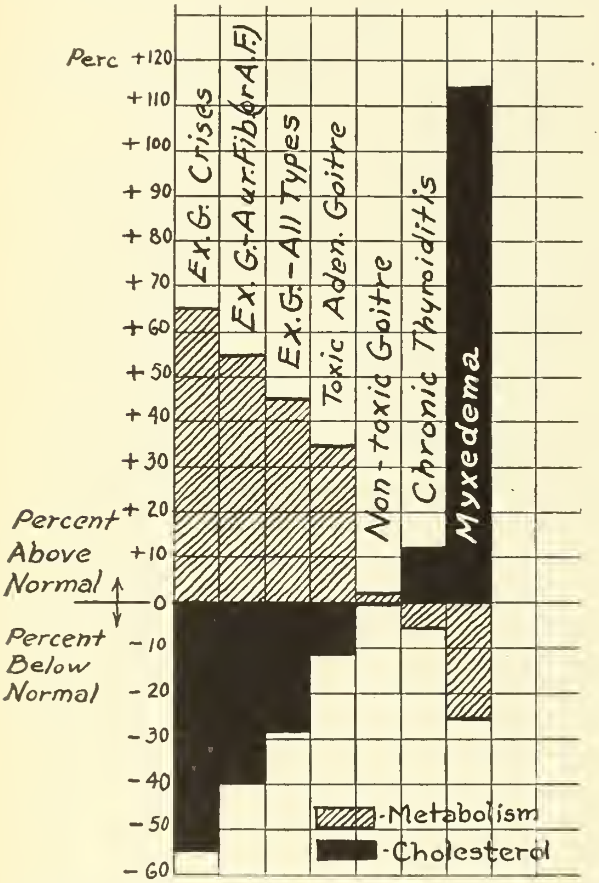


Chart 1. Chart showing relationship between blood cholesterol and metabolic rate in different types of thyroid disease, based on average values.

In the following conditions, blood cholesterols are low: infection, malignancy, emaciation, hyperthyroidism, leukemia, and vegetable diet. It is high in myxedema, nephrosis, some cases of arteriosclerosis and diabetes.

In a series of 283 cases of hyperthyroidism, with an average basal metabolism of forty-five, the average blood cholesterol was 130; highest, 245; lowest, fifty-three. Let us see how it checks with the basal metabolism.

In the patients with hyperthyroidism, the blood cholesterol is low and rises to normal after operation. Blood cholesterol determinations are of less value in hyperthyroidism than in hypothyroidism, because the range is too narrow. From our experience, one can only say that in general in hyperthyroidism the lower the blood cholesterol, the more serious the operative risk.

On the other hand, when we come to the relation of blood cholesterol to myxedema, here is a more valuable and accurate criterion. Blood cholesterol is a more accurate indicator of myxedema because it is not affected by emotional disturbances.

In thirty cases of true myxedema the average basal metabolism was minus 26.2; average after adequate treatment, minus 1.7; average blood cholesterol before treatment, 355; average after treatment 186.

Chart 1 shows the correlation between blood cholesterols and basal metabolisms in a series of cases.

Of what clinical value is this? It is a method whereby you may determine whether or not basal metabolisms of minus degree represent true drops in term of thyroid secretion. You can determine whether or not that patient will be benefited by thyroid extract. You can, I think, pick up cases of myxedema without the typical clinical features which often would be overlooked without these measures. I think to run a thyroid clinic without cholesterol estimations would be to limit oneself by the loss of one of the most valuable measures, particularly as relates to those patients who have minus degrees of metabolism.

Another interesting group of cases comprise those I have had with Dr. Joslin—exophthalmic goiter associated with diabetes.

TABLE I. PATIENTS WITH TOXIC GOITER ASSOCIATED WITH DIABETES

Secondary Hyperthyroidism

	Old Series	New Series
Number of Cases	28	30
Operated	26	26
Postoperative deaths	7.7%	3.9%
Sex: Male	4	5
Female	24	25
Age at onset of diabetes	47.8 yr.	55
Age at operation	51.5	58

Primary Hyperthyroidism

	Old Series	New Series
Number of Cases	43	33
Operated	37	30
Postoperative deaths	2.7%	0%
Sex: Male	10	9
Female	33	24
Age at onset of diabetes	40.5 yr.	42
Age at operation	43.7	43

Notice that in the old series we had a mortality of 2.7 per cent. In the recent series reported last year we had a mortality of zero. I present this table so you will realize that the status of a patient with diabetes and hyperthyroidism is more serious than with either one alone. In order to accomplish this mortality, we have had to double the percentage of cases in which we have done multiple stage operations. We do two or more stage operations in 22 percent of all our toxic cases in order to get the low mortality rate which we reported at the beginning of the talk. In patients with diabetes and hyperthyroidism, we have had to increase the two-stage operations to 50 per cent.

What may we learn from our experience regarding hyperthyroidism and diabetes? Outstandingly one point, and I am very anxious to impress this upon everyone who is dealing with this subject. If you do not approve of the surgical treatment of exophthalmic goiter, you can use rest, radium or anything else you want to so long as diabetes is not also present. Diabetes with hyperthyroidism parallels diabetes with an infection. We have been taught from our experience with diabetes that an infection intensifies the diabetes and the patient is in danger of going into a coma. We have all learned that the diabetic with an infection should be relieved of his infection as soon as possible.

If a diabetic patient has hyperthyroidism, he has an increased demand for insulin, and is intractable from the point of view of dietary management. Submit him to operation early and do the operation in two stages. Treat him as you do any diabetic or hyperthyroid case postoperatively and you will have increased his carbohydrate tolerance, lowered his demand for insulin, and he will be easier to manage from a dietetic point of view.

I wish to present to you what I think is the most interesting and the most striking of all the work which we have done in connection with thyroid disease. For a long time we have been interested in trying to demonstrate circulating thyroxin but we have not been able to demonstrate it and, so far, no one has ever been able to demonstrate it. We have tried all sorts of schemes, but I think the quantitation of blood iodine comes as near demonstrating the amount of circulating thyroxin as anything we have today.

In order that I may present to you our experiences with blood iodine in thyroid disease, I would like to lay the groundwork by going over the function of the thyroid gland as relates to iodine and its capacity to store and to discharge iodine.

Hyperplasia is the typical microscopic picture which one sees in excessive hyperthyroidism. The colloid material in the thyroid acini is undoubtedly the vehicle which carries thyroxin, and when we have exophthalmic goiter the thyroid gland contains very little colloid. It therefore cannot hold additional iodine. Dr. Cattell in the Clinic determined the milligrams of iodine per gram of dried gland in four hundred thyroids removed from patients with exophthalmic goiter. We know that in the patient with exophthalmic goiter there will be as low as 0.3 of a milligram of iodine per gram of dried gland and, at the same time, we have no or little colloid in the acini. That means the iodine has been dumped or leaked out of the thyroid and so probably the thyroxin. Thyroxin is the active principle of the thyroid gland which does everything thyroid extract does, but if you remove its iodine fraction it at once loses its metabolism elevating capacity. When the thyroid gland is relatively free from iodine and free from colloid, the iodine has probably leaked into the blood stream and it is then that one finds a high blood iodine.

The administration of Lugol's solution to a patient with exophthalmic goiter can increase the milligrams of iodine per gram of dried gland from 0.2 of a milligram to 1.5, demonstrating what a tremendous thirst the exophthalmic goiter has for iodine. That is the basis for the fact that patients with toxic goiter are benefited by Lugol's solution, and is the basis of the development of the so-called iodine tolerance test by Mr. Perkin in the Clinic.

The patient with hyperthyroidism probably has his symptoms improved by Lugol's solution because the accumulation of colloid in the acini which follows the administration of iodine presses on the blood vessels, presses on the lymphatics (Marine), diminishing thus the ability of the lymphatics to take up thyroxin, and so temporarily improves these patients. David Marine has suggested that the distention of the thyroid acini with colloid produces pressure on the secreting cells, lessening the acini and thus diminishing their activity and also by pressure diminishes the vascularity of the gland. On the other hand, after the gland has become adjusted to this involution, the blood vessels and lymphatics reopen and the symptoms of hyperthyroidism return. It is because of this that iodine is only of temporary value in the treatment of hyperthyroidism.

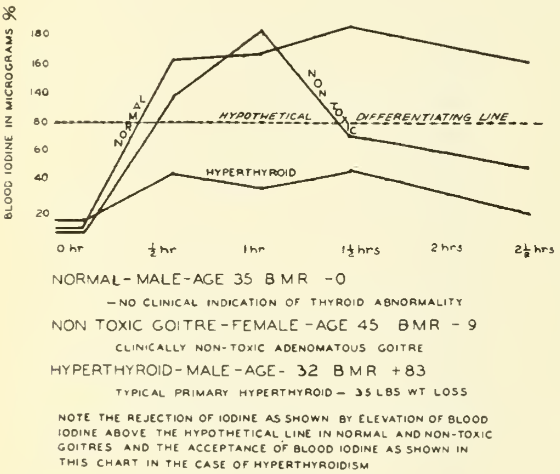


Chart 2. Graphs showing relationship of blood iodine concentration to time in normal, non-toxic goitrous, and hyperthyroid individuals following the oral ingestion of 6 min. of Lugol's solution, 37 mgm. of iodine.

In patients who are normal, who have no thyroid disease, blood iodines have averaged eleven micrograms of iodine per one hundred cubic centimeters.

Patients with non-toxic colloid adenomas have shown normal or below normal blood iodines.

Twenty-two patients with exophthalmic goiter have shown blood iodines ranging from ten up to 138 micrograms, the average being nearly four times normal (ten micrograms) per one hundred cubic centimeters. This is as one would expect it to be. If the gland is low in iodine, then the iodine must be in the blood stream, and in exophthalmic goiter the gland is low in iodine and the blood iodine is high.

It is the above stated facts that form the basis of the iodine tolerance test developed by Mr. Perkin. If we set up eighty or 100 micrograms of iodine as a theoretical base line and then if after twelve hours rest in bed the patient suspected of having hyperthyroidism is given a fixed dose of iodine (thirty-seven micrograms), and the blood iodine is determined every half hour and every hour for several hours, we can demonstrate an iodine tolerance curve. If the blood iodine curve rises above this theoretical base line of one hundred micrograms, it is evident that the thyroid gland has rejected the iodine because it is not in a state of hyperplasia. If, on the other hand, the blood iodine does not rise to or above this base line, then the iodine has been accepted by the thyroid because it is in a hyperplastic state and the probability of hyperthyroidism then becomes more definite.

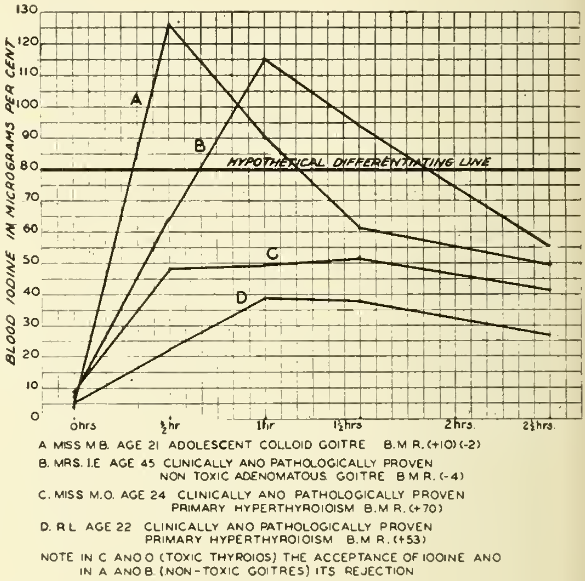


Chart 3. Graphs showing iodine tolerance curve in two cases with normal and two cases with toxic goiter.

Chart 2 depicts the curve in three cases, normal, non-toxic, and hyperthyroidism with a base line set at eighty in this case. Note that in the hyperthyroid the iodine is accepted by the hyperplastic gland, and in the non-toxic gland and normal thyroid is rejected, and the curve rising above this theoretical base line.

Chart 3 gives the iodine tolerance curve in two cases with normal and two toxic goiters. These curves represent the general trend in normal and toxic cases. In a patient with a normal thyroid and sufficient iodine, iodine is rejected, and in the case of the hyperplastic thyroid is retained.

Chart 4 shows the trend of blood iodine in twenty-two patients three months and six months after operation. Except in three cases, there has been the accurate drop in blood iodine that parallels the fall in metabolism. Two of these patients had recurrent hyperthyroidism, and one was a patient who had had a good deal of iodine.

I think the blood iodine determination offers the possibility of developing into a method of determining whether or not the thyroid gland will accept iodine, and thus whether or not hyperplasia exists in the thyroid gland. It is, frankly, not as yet a proven clinical test. When we have high blood iodines, then we probably have high thyroxin content in the blood, and when we relieve them we probably, by lowering the blood iodine, have diminished the circulating thyroxin.

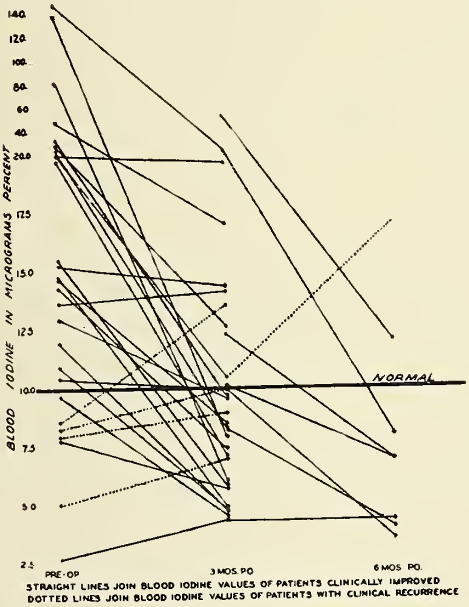


Chart 4. Graphs indicating the trend of blood iodine in twenty-two patients, three months and six months after operation.

I would like to present to you briefly our experiences with hyperparathyroidism. One patient, a woman, had a parathyroid adenoma the size of a plum in her mediastinum. Her chest was collapsed, due to the fact that her bones became so demineralized that the musculature of her chest markedly collapsed her chest in all diameters. In addition, she lost two and one-half inches in height because her vertebræ became so decalcified that they collapsed and she acquired the typical round back. In any patient who has a round back, you should do blood calciums and blood phosphorus.

The skull in these cases shows by x-ray the typical fuzzy shadow due to the decalcification which takes place in it. The parathyroid tumor which was removed from the mediastinum in this woman was the size of a plum.

In one of the cases of hyperparathyroidism occurring in our experience, the tibia and fibula became so decalcified that the longitudinal leg muscles wrinkled the bones. In this case there was the most complete decalcification I have ever seen in any patient.

Where have we found these parathyroid tumors, and where may one expect to find them? If we are going to deal with the disease of hyperparathyroidism, we must be familiar with the areas where parathyroids can be located and so where parathyroid tumors can be found.

In the course of the four hundred thyroids spoken of above which Dr. Cattell reduced to a powder, we learned that parathyroid bodies are often intrathyroid, and in that patient in whom the tibia and fibula were wrinkled two normal parathyroids had been removed in another clinic but no tumor could be found. I told the surgeons that I thought they could find it if they would look in the mediastinum and in the thyroid, because if you do not find a parathyroid tumor in any of the normal locations, you will usually find it in either of these other locations. They looked within the thyroid and found it there.

We have, on surgically removed thyroids, found transplanted and proven by microscopic section one hundred and ninety parathyroids. That has given us an unusual opportunity to demonstrate the location, normal and abnormal, of parathyroids.

We have seen and proven parathyroids to be in the branches of the superior thyroid artery, in close relation to the branch that goes to the isthmus, and in the isthmus itself of the inferior thyroid artery. Here is the common location. We have found them on the trachea, behind the isthmus, out on the main trunk of the inferior thyroid artery, on the front of the thyroid gland, within the thyroid gland and in the superior mediastinum.

Finally, I feel certain all of us are permitting patients with parathyroid tumors to pass through our clinics unrecognized. I think every patient who has lost height, every patient who has developed round back, every patient who has unexplained nerve root pains of the arthritic type, and every patient who has kidney stones should be investigated for a possible parathyroid adenoma by having his blood calcium, blood phosphorus and phosphatase determined. If he has a high blood calcium and a high phosphatase, he has a hyperparathyroidism due either to an adenoma of the parathyroids or possibly a hyperplasia of the parathyroids, and no matter how difficult it is, if you will search far enough you will find this parathyroid adenoma. If you remove it the bones will recalcify. After you remove the parathyroid adenoma, turn the patient over to an orthopedist, who will put him in the best position so that when the bones do recalcify they will do so in the best possible position and not in the worst.

SIMPLIFIED OBSTETRIC CARE*

E. D. PLASS, M.D.

Iowa City, Iowa

WITHIN the past several years, increasing attention has been directed toward those problems which have an important bearing upon maternal welfare. Various statistical studies available to the laity and the profession have emphasized the fact that many maternal deaths are preventable, but few concrete and simple suggestions toward improving obstetric results have been made. Obstetric literature generally has tended to the discussion of rare complications, to the description of new and complicated diagnostic and therapeutic developments, and to the glorification of operative delivery under standardized hospital conditions, to the confusion of the majority of practitioners who must of necessity deliver women in their homes under more or less poor conditions. When it is considered that in the country as a whole 65 per cent of all births are conducted outside of hospitals, and that in less thickly populated areas the figure may be considerably higher, it is apparent that home delivery presents a tremendous field.

During the period since the beginning of the antiseptic era, there has been a gradual development of delivery and post-partum routine care for hospital practice which has proved reasonably efficient, but which has become insidiously more complicated by the accretion of new procedures, until now it can be carried out only in institutions having every modern facility. Little serious effort has been directed at evaluating the various technics with the idea of retaining the essential and discarding the superfluous, so that there may be developed by exclusion a routine which is effective in either hospital or home and applicable to the latter. During the past twenty years we have engaged in such clinical investigations and have developed a simple and efficient obstetric care.

Pregnancy.—Except for the application of the general principles of prenatal care directed at the detection of early symptoms of somatic disease, there are few instructions which are necessary. Pregnancy is a physiologic process, even though there is a closer than usual approach to the pathologic, and there is little need for marked deviation from the usual standards of reasonable living. Too great emphasis upon the establishment of a new routine serves to set the pregnant woman apart and to aggravate the neurotic tendencies which are present in all of us.

A sensible diet includes a basic intake of milk, fruit and vegetables, valuable particularly for their vitamin and mineral content, with the addition of other energy-producing foods according to individual preference, except that articles of food which produce discomfort should be eliminated. There is no reason for proscribing meats and in fact recent evidence suggests that an adequate protein intake may protect the patient against the development of the toxemia of late pregnancy and may minimize the hydration anemia to which pregnant women are prone. In fact, we have for some time given high protein diets to those toxemic patients who have no evidence of chronic nephritis and to those with hypochromic anemia with gratifying results. When protein is ingested in the form of meat, there is no scientific reason for differentiating between the "red" and the "white" meats, including poultry and fish. There should be an adequate fluid intake and it may be wise to restrict somewhat the ingestion of salt, which predisposes to the production of edema.

---

*From the Department of Obstetrics and Gynecology, State University of Iowa, Iowa City, Iowa. Presented before the Minnesota State Medical Association, Minneapolis, Minnesota, June 25, 1935.

Provided sufficient of the three essentials of an adequate diet, milk, fruit, and vegetables, are taken, there is no good argument for the inclusion of additional mineral substances, but if there is reason for thinking that the calcium intake is too low, calcium gluconate or dicalcium phosphate may be prescribed. It should be remembered that during the last trimester of pregnancy the demand for calcium is high and equals the amount present in two quarts or more of cow's milk. During the winter, when the quantity of ultraviolet radiation is diminished, an additional supply of vitamin D is advisable. This need may be supplied by cod liver oil, viosterol, or artificial sunlight. There is no danger that this accessory food factor will produce untoward ossification of the fetal cranium and thus lead to dystocia.

In regions of endemic goiter, it is advisable to provide small amounts of iodine during pregnancy. Ordinarily, the habitual use of iodized salt will supply sufficient iodine to protect the maternal and fetal thyroids. The slight danger invoked by such prophylactic therapy is more than balanced by the benefit which may be expected.

Clothing deserves but little consideration since modern women's apparel is very sensible. It is, however, probably wise to advise against constriction of the legs by rolled stockings and circular garters which may increase a predisposition to the development of varicose veins. The wearing of tight brassieres is to be avoided. Corsets are useful only when a pendulous abdomen or relaxed sacro-iliac joints produce discomfort which may be relieved by proper support.

There has been no adequate proof that the less strenuous forms of exercise are harmful, provided that fatigue does not ensue. In fact there is every reason to believe that reasonable activity is good for the mental and physical health of the normal pregnant woman. It improves the general muscular tone and assists in preventing too great a weight gain, in addition to exerting a beneficent psychic effect.

Labor.—Parturition is essentially a surgical problem and must be approached from that angle. Anatomic and physiologic peculiarities, however, render the attack unique and demand unusual precautionary measures. The operative field lies in an area which is subject to gross contamination with the discharges from the body's metabolic apparatus and which in part comprises tissues that cannot be safely treated with the more powerful antiseptics. On the other hand, the vagina is normally protected by its own peculiar bacterial flora which develops an acidity strong enough to kill the usual pyogenic bacteria in from a few hours to three days. It is thus evident that the chief problem which confronts the physician is to do as little harm as possible.

If it be admitted that any invasion of the birth canal carries a certain risk, it becomes clear that the simplest possible routine should be the best. It has been established by controlled experiments that delivery without any perineal preparation is safe, and it should be the aim of a simplified technic to approach this end as closely as is consistent with certain principles. By many years of clinical trial it has been demonstrated that a very simple procedure is adequate. The pubic hairs are clipped with scissors or regulation clippers in order to avoid the discomfort which may ensue after delivery from clotting of the lochiæ discharges. Shaving has been discontinued because the lathering and subsequent cleansing offer the opportunity for contaminated material to be carried into the birth canal. Moreover, the average nurse or physician cannot shave this area without producing small cuts and abrasions which may become infected. The cut hairs are brushed off with a square of clean gauze but no soap and water are permitted.

Following the clipping, 2 per cent aqueous mercurochrome solution is sprayed from an atomizer over the perineal region, the lower abdomen, and the inner aspects of the thighs. While the antiseptic effect of this solution may be debatable, it has proved to be a conscience-saver and its psychic effect is good. This preparation is repeated before each vaginal examination and again just before delivery. Spraying is more economical than painting and is recommended for that reason.

A similar dry technic is employed during delivery. Dry gauze sponges and towels are used but no antiseptic solutions are available, on the basis of the belief that they offer little, if any, real protection to compensate for the potential danger involved in washing contaminated material into the vagina. The chief risk of infection during labor comes from without, in spite of the theoretical danger of auto-infection, and it is reasonable to reduce these chances to a minimum by eliminating every possibility of such contamination. For this reason, the instillation of mild antiseptics into the vagina during labor has been discarded after a clinical trial. It complicates the procedure and apparently adds nothing to the safety of the patient.

The course of labor is followed by abdominal and rectal examinations, because they are simple and generally accurate. Vaginal examinations under sterile precautions are made whenever satisfactory information cannot be obtained by the other procedures, but are not used routinely because they are time-consuming if properly performed. Relatively little experience soon brings considerable precision through rectal touch and there is no good evidence to show that this form of examination carries any risk to the patient. Sterile precautions are not necessary provided the thumb is kept away from the introitus.

Enemas are not given routinely, but are employed whenever rectal examination shows that the lower bowel contains fecal material. If the patient cannot empty the bladder, catheterization is effected using a rubber catheter. Every attention is given to seeing that the parturient ingests sufficient fluid and easily digestible nourishment.

Analgesics for use in labor are so numerous that it is impossible to discuss their reputed relative merits. It is, however, more satisfactory for the practitioner to select some drug or combination of drugs which has been adequately tested and to learn through experience how to use it than it is for him to attempt to follow the changing trend and never to become familiar enough with any agent to be confident in its employment. Personal preference due to its use over twenty years is for morphine and scopolamine, but many other drugs are valuable.

The problem of anesthesia for home delivery is equally difficult, with chloroform and ether competing for honors. The former is still, for the short anesthesia necessary in spontaneous labor, generally preferred in spite of the obvious objections to its use. Among the newer methods of anesthesia, it would seem that only infiltration and block anesthesia with novocaine or some similar drug has any reasonable place outside of hospital practice.

Spontaneous labor is safest generally and should be encouraged, interference being employed only for definite and strict indications. The modern furor for "convenience" forceps and version and for ill-advised cesarean section receives no support from the critical analyses which have been made. In a state which has a nation-wide reputation for conservative obstetrics, this need not be stressed. Operative delivery increases the risk of maternal morbidity and mortality, and raises the stillbirth and neonatal death rates.

Pituitary extract—and that includes those products which in addition presumably contain an extract of the thymus gland—have no place in the conduct of labor until after the child has been born. It should be remembered that precipitate delivery is worse for the mother and child than is a normally slow birth. On the maternal side, excluding the remote possibility of rupture of the uterus, rapid expulsive pains not only predispose to deep visible lacerations but also to invisible tearing of the uterine and vaginal fascial supports and to later prolapse of the pelvic viscera. Rapid birth is worse than slow birth for the child. Sudden molding of the head as it comes rapidly through the birth canal increases the risk of intracranial hemorrhage, which is responsible for at least 50 per cent of all stillbirths and early infant deaths. Many such catastrophes can be attributed to the unwarranted use of oxytocic agents. These drugs undoubtedly have a place in the induction of labor and in the post-partum period but not during the process of parturition. There is some doubt as to whether their use is justified during the third stage of labor, because of their apparent tendency to produce abnormal uterine contractions and to increase the danger of placental retention. At any rate our clinical experience indicates that the third stage use of pituitary extract does not consistently hasten placental expulsion or reduce bleeding.

The Puerperium.—Immediately after delivery, the puerperal woman requires constant attention for at least one hour to guard against excessive bleeding from uterine atony. It is not necessary that constant massage be instituted but the size of the uterus should be repeatedly determined by abdominal palpation and any enlargement should be met with vigorous massage until the contained clots are expelled. This maneuver may also reduce the likelihood of annoying after-pains. Generally speaking, the administration of pituitary extract or ergot preparations is not required, although such a practice leads to increased peace of mind if the patient must be left. It has not yet been decided whether the common hospital practice of applying an ice cap to the lower abdomen for some hours after delivery has any effect on uterine tone. It may be that after-pains are slightly more common but no other disadvantage can be traced to its omission.

When the delivery procedure is thus completed, the patient particularly demands rest, and during the first twenty-four hours every effort should be made to see that she is undisturbed. Beyond this point inactivity is not essential, but rather the woman is encouraged to change her position frequently and to move around in bed, although ordinarily it is undoubtedly better for her to remain in bed for a week or ten days. After the second or third day, systematic exercises are begun and continued until convalescence is well along. These exercises should be directed especially at the abdominal muscles and may include deep breathing, raising the legs, and elevating the head and shoulders. Each day should see the addition of some new feature to make the procedure cumulative. At the end of a week, the knee-chest position is assumed for increasing periods each day until it can be maintained for fifteen to twenty minutes twice daily. This maneuver may have some effect upon the position of the uterus, but is prescribed not for this reason but because it mechanically alters pelvic circulation, prevents congestion and improves blood vessel tone. Such a program of puerperal exercises not only puts the patient in better condition when she leaves the bed but apparently reduces the incidence of "milkleg" or femoral thrombophlebitis, which is one of the more annoying sequelæ of mild uterine infections.

By custom, the puerperal woman has long been treated as if she were ill and has for some days been given a restricted diet, even though common sense demands that she be well fed. For years, every puerperal woman, unless suffering from some disease which demands dietary restriction, has been given a full diet from the time of delivery, together with supplementary feedings between meals. No harm has ensued and it is believed that such a program hastens the recovery of strength. From what little is known concerning the relation of dietary factors to lactation it seems logical to give a diet relatively high in protein and in vitamin B. For this reason the use of leafy vegetables and milk is encouraged. Yeast may be employed to augment the vitamin intake.

The older idea that the puerperal woman should have a drastic cathartic during the day after delivery has been abandoned as unwise. In the presence of a perineal repair especially, such a procedure violates two surgical principles: violent fecal evacuations inevitably disturb the wounded area and subject it to the danger of infection with bowel contents. It is far better to wait approximately three days before evacuating the bowel with a simple enema or cathartic. Subsequent regular bowel movements may usually be secured through the twice-a-day administration of moderate doses of plain mineral oil, which carries the theoretical risk of absorption and elimination of the fat-soluble vitamins A and D, but which is undoubtedly preferable to the continued use of any other cathartic agent. In rare instances, diarrhea appears in the nursing child while the mother is taking mineral oil and is relieved when it is discontinued. This action must be indirect since the oil is probably not absorbed and certainly could not be secreted in the milk. In spite of the common belief that constipation produces fever, no good evidence has been offered in support. The fact that the temperature may subside after a cathartic has been given does not constitute acceptable proof, for such a situation may be balanced by the observation that a patient with a repaired complete tear may go without a stool for a week or longer without a temperature elevation. In fact, normal puerperal women have purposely been constipated for several days without any effect other than the loss of nervous equilibrium encouraged by newspaper and radio insistence upon the evil results of autointoxication.

As a hold-over from the days when antisepsis was to save the human race, the usual routine care of the post-partum perineum wastes a great deal of the nurse's time, disturbs the patient and does more harm than good. The perineum, especially when it has been repaired, is a healing area which above all demands rest. The usual procedure of douching, wiping, and mopping violates this principle. Better results are obtained if the area is kept reasonably clean by washing once or twice a day with soap, water, and washcloth, without the exhibition of any antiseptics. There is less trauma, less pulling on exposed sutures, and better conditions for healing. Within three days after delivery the patient ordinarily takes her own bath, as a part of her daily exercise, and also cleanses the vulval region. The more extensive the laceration and repair, the more effective this "let-alone care" is. It is also completely applicable to secondary repairs and other plastic vulval or vaginal operations.

Another abomination is the vulval pad which is still commonly employed to collect the lochial discharge, in spite of the fact that it has everything to condemn and nothing to commend it. It inevitably pulls exposed sutures, exposes the lacerated area to possible contamination through the fact that it changes position as the patient moves around in bed, and retains possibly infected material in contact with the wound. A saner and more satisfactory procedure consists in placing an absorbent pad under the patient's buttocks and to replace it when soiled. Such pads are easily made from cotton with a newspaper back and are inexpensive. Later when the patient is out of bed, the usual T-binder and vulval pads are employed, but by this time the wound has healed and no harm is done.

The general practice of applying boric acid solutions to the nipples before nursing constitutes an unwarranted waste of time. The time of application is so short that the weak antiseptic employed can do no good. For years this procedure has been eliminated without any increase in mastitis, the only complication it might prevent. For protection, the nipples may be covered with a square of gauze held in place by strips of adhesive or a breast binder. No other attention is given unless an abnormality appears.

Overdistended breasts are treated by support and analgesics, but rarely by pumping, since removing the milk merely stimulates the secretion of more. Mammary gland distention does not produce fever in itself. When an elevated temperature appears as the mammary glands begin to function, every attempt should be made to explain it on some other basis—milk fever is not an entity.

Cracked nipples particularly demand rest. The baby should be fed from the bottle for at least forty-eight hours while distention of the breasts is relieved by occasional pumping. The milk thus obtained can be supplemented by formula to provide sufficient nourishment. The application of irradiated vaseline is perhaps more effective than the more commonly employed castor oil and bismuth paste. Heat and light as supplied by a near-by electric bulb apparently hasten the healing. In more stubborn cases, recourse may be had to silver nitrate solution or stick, but this is rarely necessary. When nursing is resumed, a nipple shield reduces trauma to the recently healed area.

To dry up the breasts, when that is advisable for any reason, the simplest and quickest procedure is to stop nursing abruptly, bind the breasts tightly to the chest wall with muslin bandages, and provide analgesics for the relief of pain. Ice caps may be applied but are of doubtful value. Clinical tests have indicated that the period of discomfort is not lessened by inducing watery stools through the repeated administration of saline cathartics nor by reducing the fluid intake. Pumping, stripping, and massaging the breasts only prolong the process and are not advisable.

Mastitis rarely occurs during the first week after delivery, but may then appear at any time during the lactation period. Its advent may be accompanied by constitutional symptoms—fever, chills, and malaise—out of proportion to the palpable lesion. There is usually a tender mass with redness of the overlying skin. Support and the constant application of ice caps constitute the accepted treatment. Unless the temperature falls to normal within forty-eight hours, it is probable that suppuration has occurred. Another significant sign of breast abscess is demonstrable edema of the overlying skin. When pus is present, it should be evacuated according to recognized surgical principles under general anesthesia, which permits digital exploration of all the abscess pockets.

No attempt has been made to cover all phases of obstetric care, but attention has been given to those procedures which have been developed to replace needlessly complicated and time consuming technics. Every suggestion offered has been submitted to careful clinical study and has proven at least as effective as the time-honored procedure which it displaced. The net result has been that nurses have been relieved from practically all special nursing routine and can spend more time upon those duties which have actual constructive value. Moreover, the recommended technics can, with minor variations, be utilized in home delivery practice.

THE PRESENT STATUS OF CLINICAL ALLERGY*

H. L. ALEXANDER, M.D.
St. Louis, Missouri

THE title of this communication permits a good deal of latitude, and I have taken the liberty to assume that this audience is composed of those not thoroughly versed in the subject. If, then, I reduce what I have to say to rather simple terms, some of which may already be known to you, my purpose will be understood. In presenting this subject, I shall treat of it first in general terms, and then with the specific manifestations of allergy, as asthma, hay fever, etc., and interpret the more recent contributions about them.

The present status of clinical allergy will be appreciated more if it be related to its early status and something said of the history and the phenomenal development of the subject during the past twenty years. Clinical allergy grew out of the conception of anaphylaxis. In the early years of this century it was discovered, really rediscovered, that if a protein substance foreign to the body, such as horse serum or egg white, were injected into certain animals, no symptoms developed. If after some two weeks this process were repeated, sudden violent and fatal manifestations often occurred. The early application of this phenomenon of anaphylaxis or protein sensitization to man dealt with the occasional cases of violent illness and death that occurred after the use of antitoxins. Such symptoms had heretofore been explained by the assumption of some toxic substance in the horse serum. Among the immediate symptoms of protein shock are asthmatic breathing, sneezing, and urticaria. Moreover, in guinea pigs, after the second or shocking dose, the animal sneezes and then develops bronchospasm which causes great ballooning of the lungs. These manifestations led to the suggestion that bronchial asthma, urticaria, and sneezing attacks as in hay fever and vasomotor rhinitis, may all be due to protein sensitization. Until this time it had been recognized that these clinical conditions occurred together occasionally in a given individual, but each had been considered a separate disease. Other than hay fever, the etiology of each was unknown.

The conception that these were not separate diseases but merely different manifestations of one underlying condition, protein sensitization or anaphylaxis, was developed and between the years 1911 and 1915 proven to be true by various investigators both in England and in this country. The proof lay in the fact that if the proper protein substance were rubbed into a scratch in the skin, a generalized sensitization could be shown by an immediate red, itching swelling at that spot. Not only, then, was the new clinical idea expounded that asthma, hay fever, vasomotor rhinitis, urticaria, eczema, and unexplained gastro-intestinal disturbances, for which treatment had been very unsuccessful, were all due to protein sensitization, but, by means of the skin test, the particular offending protein could be discovered, eliminated, and the patient cured.

This advanced idea seized clinical imagination, but the performance of the skin tests required skill as well as patience, and many testing materials, so specialists in the field developed. It was found that sensitization in man was immunologically different than that of anaphylactic animals, therefore the word "allergy," a term already in use to denote the sensitivity of a tuberculous individual to tuberculin, was used in a broader sense to include those with protein sensitiveness. By 1922 and 1923 enough specialists had developed to form two national societies for the study of this new allergy. By 1929, the publications on the subject were so numerous that a Journal of Allergy was founded, and this year another Journal of Allergy has appeared in Italy. Meanwhile, assembled statistics indicate that an appreciable percentage of the population—10 to 15 per cent at least (some say much more)—suffer some allergic disturbance. This means somewhere from 13 to 20 million people. Of these a fair proportion, at least many with asthma and hay fever, are candidates for medical attention. Such circumstances, namely a new clinical entity with dramatic manifestations, the promise of relief, and an enormous potential clientele, have attracted many hundreds of doctors to specialize in it wholly or in part and always with enthusiasm. Allergic aspects of dermatology, otolaryngology, gastroenterology, and recently gynecology, urology and cardiology, have their exponents, and no wonder the ordinary doctor is left bewildered as this ever-broadening vista rapidly unfolds before him.

---

*From the Department of Internal Medicine, Washington University School of Medicine and Barnes Hospital, St. Louis, Mo. Read before the annual meeting of the Minnesota State Medical Association, Minneapolis, June 24, 1935.

TABLE I. POSITIVE SKIN REACTIONS IN 11,443 CASES OF ALLERGY

Allergic Manifestation	No Observers	No. Cases	No. Positive Reactions	Per Cent Positive Reactions
Hay fever	9	4,381	4,076	93.2
Vasomotor rhinitis	8	1,020	568	55.7
Eczema (infant and adult)	10	775	408	52.7
Bronchial asthma	13	4,809	2,536	52.7
Gastro-intestinal allergy	4	460	122	26.5

An explanation of clinical allergy may be based upon a few underlying principles which will be here stated, although doubtless much of this is already known to you. In the first place, allergy is inherited, which accounts for the frequent family history of asthma, hay fever, et cetera, in the forebears or collaterals of allergic subjects. A child born of allergic parents inherits something that normal children do not have; and that is the ability or capacity to become sensitive to some foreign protein substance after sufficient contact with that substance. Normal children drink cow's milk with benefit. An allergic child may develop a sensitivity to milk protein, so that he can no longer tolerate it. All through the first half of his life he may suffer from this aversion to one protein or another. When he does, the sensitive cells of his body which come in contact with the particular offending protein develop a toxic substance akin to histamine. This, in turn, causes a sudden, explosive reaction in the form of an intense edema. That is what the skin test is, a sudden edema at the spot where the protein comes in contact with the sensitive skin tissue. If smooth muscle is present, as in the lung and bowel, a contraction or spasm occurs and asthma or colic results. Finally, an allergic individual is not sensitive all over, but only in spots; and these spots are located particularly on the skin, in the respiratory tract and in the gastro-intestinal tract. Hence the manifestations of allergy are eczema, urticaria, asthma, vasomotor rhinitis, hay fever, and gastro-intestinal symptoms, all of which are due to edema and smooth muscle spasm. Other tissues are probably involved, as the meninges (allergic migraine), and possibly other viscera. These "shock organs," moreover, are not all sensitive at the same time. One child may eat wheat and have asthma. For the wheat or its digestive derivative to reach the bronchi, it must get into the blood stream. Here it comes in contact with all the body cells, but finds only those of the bronchi sensitive. Another child eats wheat and has only eczema, since the skin cells alone are sensitive, and so on.

This localized sensitivity has a very important bearing on an understanding of skin reactions. There is much dispute among allergists today concerning the evaluation and interpretation of the skin test, let alone the technic of its performance. The valuable information that a correctly interpreted test imparts has led to its widespread use. Unfortunately, this has resulted in one of two things: either the test has been discarded as too unreliable, or it is retained and interpreted literally so that every positive reaction or questionable reaction is considered signifi-

TABLE II. INCIDENCE OF REACTIONS WITH COMMON INHALANT ALLERGENS (32,182 TESTS)

Allergen	No. Tests Done	No. Positive Reactions	Per Cent Positive Reactions
Feathers *Ch. G. D.	5,491	1,130	20.3
Orris Root	2,537	429	16.9
Horse Dander	2,798	463	16.6
Wool	602	68	11.3
Pyrethrum	1,153	108	9.3
Cat Dander	1,667	154	9.2
Cattle Dander	745	65	8.7
Dog Dander	365	19	8.3

All others less than 5 per cent.

*Ch. = Chicken, G. = Goose, D. = Duck.

TABLE III. INCIDENCE OF REACTIONS WITH COMMON FOOD ALLERGENS (32,182 TESTS)

Allergen	No. Tests Done	No. Positive Reactions	Per Cent Positive Reactions
Wheat	1,999	447	22.4
Egg	923	170	18.4
Milk	1,176	171	14.8
Chocolate	285	40	13.9
Spinach	330	44	13.3
Bean	822	126	12.9
Potato	604	73	12.1
Tomato	522	62	11.9
Carrot	329	39	11.8
Pea	548	63	11.5
Barley	644	69	10.7
Rye	946	84	8.9
Pork	508	42	8.3
Beef	527	42	7.7
Oat	1,711	115	6.7
Corn	1,774	117	5.7
Rice	635	36	5.7

All others less than 5 per cent.

cant. As a result, since multiple skin reactions are frequent, there may be dietary and environmental restrictions to the point of nutritional detriment and a life so sheltered from lurking allergens that the cure becomes worse than the disease.

Statistics concerning the percentage of positive skin reactions in various allergic disorders vary with personal experiences. A list compiled a few years ago is given in Table I.

The test appears to be very reliable in hay fever, positive in about 50 per cent of patients with vasomotor rhinitis, eczema and asthma, occasionally so in gastro-intestinal allergy, whereas in urticaria it is rarely positive. Since a positive reaction results from contact between the allergen applied to the skin and the reacting sensitive cells, then a negative test implies that no antibody is present to react with the allergen, which is in keeping with the fact that the body is sensitized only locally. In any given case the skin may or may not be sensitive. If not, then no amount of testing will bring out a positive reaction. Were this all, then at least the test would offer a partial certainty. Unfortunately, when reactions are positive there are many conditions to their interpretation. First is their variability. They may be positive at one time and negative at another, and although this is not the rule it is something to keep in mind. The degree of reaction varies at different sites of the body. When it is large on the back and abdomen, it is smaller on the arm and often negative on the leg. Finally, and this is discouraging, positive reactions occur that have no meaning whatever. In view of these facts, positive skin reactions other than in hay fever must be regarded with caution, and negative reactions as by no means ruling out the allergens employed.

Fortunately, other than pollens, there are comparatively few allergens that cause most symptoms. By and large, they are the ones with which contact is most frequent, and are listed in Tables II and III.

If one eliminates these he will remove the principal source of symptoms in the majority of allergic patients other than those with hay fever. The treatment of allergy, no matter what the skin reaction, is, after all, one of environmental control including diet elimination, with hyposensitization when removal is not possible. Although the consideration of the above list of allergens alone must be looked upon as a short cut, the fact that many cases can be thereby controlled by the non-specialist brings the preliminary treatment of such patients into the hands of practitioners, and offers them a logical approach. Should this not prove successful, the specialist should be called in.

Time will permit only a few remarks concerning specific allergic disorders:

Asthma.—In the past, many asthmas (renal, bronchial, thymic, cardiac, nervous) have been considered separately. It is now recognized that the great preponderance of patients with asthma are allergic. Of diagnostic significance is the finding of eosinophiles in a mucoid sputum. In no other condition does this combination occur. The finding of pus also merely indicates a superadded bronchitis.

Many cases of asthma are due to the inhalation of dust emanating from bedding. Such particulate matter contributes to the sweepings of a room, and many patients give positive skin reactions to extracts of sweepings—a composite allergen known as "house dust." Until very recently the composition of the reactive substance in house dust was undetermined. Cohen[1] found that feathers, cotton and other organic material in bedding when exposed to the air gradually changed, perhaps decomposed, and became allergenic. This new discovery has a very practical bearing in that a change of pillow or mattress may be of but temporary benefit, so that the safe thing is to completely cover the bedding with some impervious material as rubberized sheeting, which can now be secured on the market as envelopes to encase standard sized mattresses and pillows.

New asthma remedies are constantly being advertised, but none have superseded epinephrin, ephedrin and iodides. Rowe,[3] however, has recently reported the use of a strong adrenalin hydrochloride solution, 1 to 100, sprayed through a vaporizer against the back of the pharynx and thus inhaled. This seems to be as effective as hypodermic injection and far more convenient.

Death from asthma is no longer the rare phenomenon of ten years ago. When sudden, autopsy almost always reveals a plugging of large areas of bronchi and bronchioles with tough mucus. Curiously, in many such cases the onset occurs nearer middle life rather than characteristically in the earlier decades. The duration may be but a year or two, with constant, progressive, intractable symptoms, in contrast to the chronic asthmatic with paroxysms dating from childhood. The etiology of this pernicious asthma of middle age is quite unknown.

Finally, there is coming to be a gerater appreciation of the fact that much of the dyspnea of asthmatic individuals is due to underlying emphysema. All allergy is functional in that the edema and smooth muscle spasm are transient and when they disappear there is a restitution of normal tissue. In asthma alone there is frequent permanent structural damage and the lung tissue becomes gradually stretched and loses its elasticity. Emphysema is an inevitable consequence of prolonged asthma, and when advanced, no matter whether the paroxysms are controlled, the individual is crippled by the handicap which emphysema imposes upon respiration.

Hay Fever.—In the past few years, methods have been devised for the identification as well as the enumeration of the pollen granules present in the air. Almost the entire country has been surveyed, so that information is at hand concerning the concentration of hay-fever producing pollens in various localities. Such daily information is very useful in correlating the amount of pollen contact with the patient's symptoms. Severe hay fever with but few pollens in the air at once leads to the suspicion of extrinsic factors. Moreover, such established surveys are of use in planning summer vacations and places of residence.

There seems to be little doubt that hay-fever symptoms may be aggravated by extra pollen factors. This is sometimes spoken of as "added effects." For instance, a patient may be slightly sensitive to corn or milk, scarcely enough to cause symptoms. If these are ingested during the pollen season, they may greatly exaggerate the hay fever. For that reason, many allergists test all patients with hay fever to foods or otherwise examine and control the diet.

Various dust-catching devices have been designed for the purpose of excluding pollens from rooms. Recently the use of air-conditioning with or without filters has been highly recommended. As yet none of this apparatus has proven more than partially effective, although Criep[2] has just reported the use of electrostatic plates, a principle use for mine dust, and from his figures this method far surpasses anything as yet reported.

Concerning the merits of the various forms of treatment by injection, such good results are claimed for each that it is difficult to evaluate them. A survey designed for this purpose revealed no definite answer. As a matter of convenience, the perennial method of treatment, wherein an individual once hyposensitized is kept so by the repetition of an injection of concentrated extract every two or three weeks throughout the year, has its merits. Certainly, having patients' skin tested before treatment is begun to determine the strength of extracts to be used is quite superior to any constant dose stated on the drug-store package.

Vasomotor Rhinitis.—It is of interest that although the nasal symptoms of hay fever and of vasomotor rhinitis (perennial hay fever) are identical, there is such a wide discrepancy of positive skin reactions between the two conditions. It is coming to be more recognized that although inhalant allergens are usually responsible for the condition, the food factor is coming into more prominence. The conventional treatment is environmental control and trial diets, and occasional hyposensitization. There is, however, a group of cases, perhaps 20 per cent, wherein anti-allergic measures are entirely unsuccessful. These have been attributed to endocrine and metabolic disturbances, but their etiology is unknown.

The presence of eosinophiles in the nasal secretion has lately been accepted as a diagnostic criterion of allergic rhinitis. Although there is some debate concerning the accuracy of this test, it remains by far the best.

At the present time, ionization of the nasal mucosa is a popular form of treatment for nasal allergy. A recent consideration of the subject revealed that although temporary relief occurs for a short time after treatment in almost all cases, the procedure has little value in hay-fever or vasomotor rhinitis with marked skin tests and reagins (sensitizing bodies) in the blood. In the latter condition where no reagins are present, and these cases would include the above 20 per cent without known etiology, treatment by ionization may have a distinct place.

Gastro-intestinal Allergy.—It is here that one becomes mired more than anywhere. To begin with, the distinction between "food allergy" and "gastro-intestinal allergy" must be made. The former, a bad term, refers to any allergic lesion caused by food ingestion, the latter to symptoms in the alimentary canal. Concerning these, most of the functional digestive disorders and some organic ones have been considered allergic, although the proof of this is usually empiric in that improvement occurs on a proper diet. A wide discrepancy of opinion concerning these cases exists between the allergist and the gastroenterologist. The latter recognizes allergic factors as a cause of symptoms, but only occasionally. Doubtless his expert judgment is of more value in the interpretation of gastro-intestinal symptoms than is that of the allergist. Each recognizes that such symptoms as colic, mucous colitis, vomiting in childhood, and sudden diarrheas, may be caused by food sensitiveness. Of particular interest are the cases of so-called pseudo-cholecystitis, wherein the symptoms of biliary colic are duplicated. Before cholecystography, many mistaken diagnoses were recorded.

Desensitization by peptone advocated by French observers, or by Urbach's propetan, taken before meals, a method recently written about extensively, has found little favor in this country.

Elimination diets are of much value, although many are more elaborate than need be.

A true evaluation of gastro-intestinal allergy remains to be made.

Allergic Dermatitis.—This term is confined to the characteristic superficial eczematous lesions. Recently three forms have been identified:

1. Allergic eczema occurring in the folds of the arms and legs, typical eczema. This is due to the same type of allergen, usually foods that cause allergic lesions elsewhere.

2. Contact dermatitis is distributed at points of contact with clothing or with external irritants, such as the hands (soap), eyebrows (mascara), scalp (hair dyes), neck (furs), etc. The underlying mechanism in this type of sensitivity is different than in other allergic lesions and the reaction is entirely superficial. Many of the offending factors are fat soluble, and are prepared in oily solutions for the so-called "patch test." Here the suspected substance is applied to the skin underneath a patch of adhesive plaster. In twenty-four to forty-eight hours a typical dermatitis appears beneath the allergen in question.

3. A dermatitis similar to the above may appear in patches anywhere on the skin as a manifestation of fungus sensitization. The fungus need not be in the presenting lesion. Cases of athlete's foot with trichophytes in the skin between the toes may sensitize the skin elsewhere. Here intradermal tests with extracts of fungi, notably trichophytin and oidiomycin, when markedly positive, reveal the cause of the dermatitis, and treatment by intradermal injections is often successful.

There are other forms of allergic skin disorders, notably urticaria and allergic purpura. Many cases of urticaria doubtless are not allergic in the strict meaning of the word. Certainly no allergic factor can be made out. Some of these cases are doubtless due to unusual reactions to physical agents as heat, cold, light, and stroking the skin, a conception developed by Duke. In such cases "desensitization" by increasing exposure to the offending agent is dramatically successful.

This sketch of a few recent considerations of clinical allergy is far from complete both as to substance and to the disorders which may be allergic in origin. With the exception of some types of migraine, however, it includes most conditions where allergy has been established. Many of the newer claims remain either to be proven or to have experience accumulated behind them. That some of these are truly allergic is beyond question, but for him who is not an expert in the field, a safer position to assume is one wherein attention is attracted to that which is known.

One word in closing concerning the future of allergy. What I have said this afternoon refers to but one phase of allergy. Serum sickness and serum shock are others. By far the largest application is sensitiveness to bacteria. Symptoms of tuberculosis, rheumatic fever, scarlet fever, and other infectious diseases are due not alone to the invasion of bacteria in the organs involved but to sensitization of tissues to bacterial products. The nephritis following streptococcus infection of the throat, the arthritis that follows foci of infection elsewhere, are examples of this. The immunologic mechanism is different from other forms of allergy, but all are manifestations of hypersensitiveness. The study of bacterial allergy has scarcely begun, and we are on the threshold of a new phase which has implications much wider than those discussed today. This is the allergy of tomorrow.

References

1. Cohen, M.: Paper presented before joint meeting of the Society for the Study of Asthma and Allied Conditions and the Association for the Study of Allergy, Atlantic City, N. J., June 10 and 11, 1935.
2. Criep, L.: Quoted by Cohen.
3. Graeser, J. B., and Rowe, A.: Inhalation of epinephrine for relief of asthmatic symptoms. Jour. Allergy, 6:415, 1935.

CONTINUOUS INTRAVENOUS INFUSION*

A Consideration of Its Possible Dangers

THOMAS G. ORR, M.D.
Kansas City, Kansas

NATURE never intended that the human being be fed and watered by vein, and, therefore, the insult of such a procedure should be respected. This statement is offered as a fair attitude to assume toward intravenous therapy in general, since it appears quite evident from personal observation and a perusal of the literature that little thought is given to the possible dangers of this popular method of therapy. This caution, however, is not to be interpreted as a destructive criticism, or with any thought in mind that such a valuable means of therapy should be discontinued. To assume such an attitude toward a well established method of treatment would be just as illogical as to say that operations should be discontinued because of their ever inherent dangers.

Clinical observations and experimental work of M. J. Rumold[12] on thrombosis and embolism in the University of Kansas Surgical Clinic have impressed upon us the necessity of more careful methods of administering liquids by vein. The chief dangers we have encountered have been: (1) Reactions with chills and fever; (2) the overburdening of the circulating system by a rapid increase in blood volume; (3) production of general edema and edema of the lungs; (4) kidney irritation with blood in the urine; and (5) thrombosis at the site of intravenous injection with embolism.

In recent years very few immediate reactions have resulted from intravenous therapy in our clinic. All solutions used are freshly prepared daily under the supervision of a bio-chemist and carefully handled by trained technicians. Proper preparation of solutions and apparatus, and the more modern tendency to give infusions slowly, have reduced this danger until it is almost negligible. It is recognized, however, that the now universal use of intravenous solutions makes it mandatory that the danger of post-infusion reactions be emphasized.

---

*From the Department of Surgery, University of Kansas School of Medicine. Read at the 82nd annual meeting of the Minnesota State Medical Association, Minneapolis, June 26, 1935.

The overburdening of a weakened circulatory system by a too rapid increase in the blood volume is a danger not to be considered lightly. It seems apparent that not infrequently intravenous solutions are given without due consideration of the pathologic changes that may exist in the heart and blood vessels. Clark[4] has called attention to acute cardiac dilation as a result of intravenous injection. He reports three deaths and mentions a fourth which he believes were cardiac deaths secondary to dextrose and sodium chloride solutions given intravenously. In my own experience, one death has occurred which seemed to be attributable to an excessive quantity of liquid given by vein to an anemic patient with damaged heart muscle. When considering intravenous therapy for an ill patient we must not be misled by the now well known fact that normal experimental animals will tolerate massive doses of dextrose and sodium chloride solution in the strengths used clinically without apparent harmful effects. This fact has been clearly proven by Warthin,[15] who has injected dogs with as much as twenty times the quantity of solution given the human subject without evidence of circulatory embarrassment. In order to produce pulmonary edema in a dog it was necessary to inject the equivalent of twenty-five liters of fluid for a human being in thirty-five minutes. While these experiments on healthy dogs may be evidence that the normal human individual would tolerate without injury large quantities of liquid given by vein, Warthin very properly warns that the results of his experiments should not be interpreted as justifying the injection of larger quantities of fluid than are given at the present time.

The development of edema during the administration of intravenous infusions is not an uncommon observation. The edema appears first about the feet and ankles and in the flanks. In one of my own patients, a too ardent forcing of liquids while treating a lower abdominal peritonitis resulted in a general anasarca. Coincidentally pus and red blood cells appeared in the urine. The edema and evidence of kidney irritation promptly disappeared by reducing the liquid intake.

The relationship between kidney irritation and excessive quantities of dextrose and salt given by vein is difficult to estimate in patients with acute infections. The following two cases observed in the University of Kansas Hospital indicate that continuous infusions may have been causative in the production of acute nephritis. The first patient was a young man, aged 19, who had a diffuse peritonitis following a ruptured appendix. He received continuous infusion of 5 per cent dextrose for a period of ten days when gross blood appeared in the urine. At the same time he had marked edema of the feet, legs and lumbar region. The blood in the urine and edema disappeared soon after the intravenous therapy was discontinued. The second patient was a female child, aged 6, who also had a diffuse peritonitis as a result of a ruptured appendix. After receiving continuous infusion of 10 per cent dextrose in physiologic saline for several days, blood appeared in the urine. The blood in the urine disappeared after discontinuing the infusion. It is, of course, recognized that the kidney complications in these cases may have been due to the acute peritoneal infection, but the prompt disappearance of blood in the urine after discontinuing the intravenous therapy suggests a definite relationship between such treatment and kidney irritation.

The possibility of thrombosis and embolism as a result of intravenous infusions, and especially continuous phleboclysis, is worthy of very careful consideration. The therapeutic use of hypertonic solutions of dextrose and sodium chloride as sclerosing agents in the treatment of varicose veins is significant. Bsteh and Teichmann[2] record three cases of pulmonary embolism arising from thrombi produced by the injection treatment of varicose veins of the leg and discuss briefly the percentage of such occurrence as reported by other authors. These observations should, of course, be sufficient warning that hypertonic solutions injected into the vein for other therapeutic purposes might result in dangerous thrombosis and embolism. In 1930 Orator and Schleusing[11] reported a case which at autopsy showed pulmonary and cerebral emboli, the latter causing death. Continuous infusion of dextrose was given into the left basilic vein through a glass cannula. At the site of injection, a thrombus formed which was considered the source of the lung and brain emboli. The brain emboli were possible because of a patent foramen ovale. These authors recognized the need of infusions when quick relief is desirable, but state that the general use of continuous infusion should be discouraged. Friedrich and Buchaly[6] have described two patients dead with pulmonary embolism in less than one year attributed to continuous phleboclysis. The authors have suggested that infusions be given over shorter periods of time; that the site of injection be changed frequently; that the solutions, as nearly as possible, be the same in composition and specific gravity as the blood and that this type of therapy be used only when strongly indicated. Strauss[13] states that "venous thrombosis and thrombophlebitis have increased in spite of the assumption by many that continuous intravenous therapy is harmless." He recorded a patient who died of pulmonary embolism after receiving continuous infusions of dextrose and sodium chloride solutions for five days postoperative. He recommended that this type of therapy be used only when strongly indicated. Quite recently Tomarkin and Strauss[14] have discussed the dangers and contraindications of venoclysis. They point out the important fact that infection at the site of infusions may be a major danger in this type of therapy. One of their patients developed a thrombophlebitis which was later followed by abscesses in the arm and osteomyelitis of the vertebræ and tibia, resulting in death. In a personal demonstration, J. O. Bower[1] of Philadelphia has shown me a specimen of infarcted lung removed from a young man dead of an infected embolus arising from the basilic vein following continuous infusions.

The following report of an embolic death in the University of Kansas Hospital is recorded at this time.

H. C., male, aged fifty-eight, had a bilateral herniorrhaphy under local anesthesia on September 2, 1933. The second day following operation marked distention of the abdomen was present. On the fourth day there was a slight icterus. From the third to the sixth postoperative days, four liters of physiologic sodium chloride solution were given by hypodermoclysis. In addition to the four liters of physiological sodium chloride given by hypodermoclysis, 3,750 cubic centimeters of a 10 per cent dextrose in physiologic sodium chloride solution were given intravenously on the fifth and sixth postoperative days. Death occurred on the seventh postoperative day. Autopsy revealed no pathology within the abdomen. There was definite thrombosis of the left basilic vein and pulmonary embolism and infarction. It was the opinion of the pathologist that death resulted from pulmonary embolism as a result of an embolus arising from the thrombus in the left basilic vein at the site of infusion.

Recent experimental work lends support to the view that intravenous infusions are a source of some danger. H. E. Carlson,[3] while experimenting with peristaltic stimulants, observed two sudden deaths in dogs due to large emboli originating in the jugular vein. In one animal, five injections of a 4 per cent sodium bicarbonate solution had been made into the jugular vein before a final injection of 20 per cent sodium chloride solution loosened an embolus, causing death in five minutes. Autopsy showed a large embolus in the right auricle extending into the right ventricle. In the other animal, an embolus was released from the jugular vein by an injection of 20 per cent sodium chloride solution six days after two previous injections. Death also occurred in this animal within five minutes. The autopsy revealed a large embolus in the pulmonary artery. In a series of experiments on dogs, using continuous infusion of 10 per cent dextrose or physiologic sodium chloride solution, M. J. Rumold[12] has shown that a high percentage of animals thus treated until death showed infacts and thrombi in the lungs. His animals were partially restrained in cages with a cannula secured by suture in the jugular vein. The solution was given slowly at an average rate of ten to twelve drops per minute. An assistant was in constant attendance day and night to frequently check the rate of flow of the solution. A number 12F soft rubber catheter was used as a cannula. As controls a number 18 sharp steel needle, a gold cannula and a rubber catheter were each placed in the jugular vein of a dog without the infusion to test the effect of the mere presence of a foreign body in the vein. This procedure produced changes in the lungs similar to those found after continuous phleboclysis. Doctor Rumold concluded that a foreign body, such as a cannula, lodged in the vein of a dog produces an inflammatory reaction throughout the wall of the vein and that this foreign body is more active in the production of thrombi than the infused solution. All dogs showed a high incidence of pulmonary infarction and thrombosis after receiving continuous infusion until death. The pulmonary infacts usually were associated with other pulmonary changes such as pneumonia or edema. These experimental findings indicate that continuous intravenous infusions are not without danger.

Discussion

In 1924 Matas[9] made the statement in his classic article on "continuous intravenous drip" that "salt infusions, whether by hypodermoclysis, intravenous drip or by any other method of administration are positively contra-indicated in all toxic states in which degenerative changes in the renal epithelium with salt retention occur, and also in all conditions in which pulmonary stasis from an enfeebled cardiovascular circulation predispose to hypostatic edema of the lungs." De Takats[5] has made the observation that it is undoubtedly possible in a surgical patient, whose cardiac insufficiency is barely compensated, to produce a decompensation with edema and dyspnea by forcing fluids. In support of this statement he records the death of a postoperative thyroid patient, sixty-five years of age, who had received daily 7,000 cubic centimeters of physiologic sodium chloride solution for five days.

We have noted in our laboratory that if very large quantities of salt solution are given to normal dogs they will develop muscular twitchings and tremors, incoördination of muscles and general weakness which will result in death. Two such animals have been observed with a whole blood chloride reading of more than 800 milligrams per 100 cubic centimeters. Doctors Ockerblad and Carlson[10] observed twitchings of the muscles of the entire body in a patient receiving 13 liters of physiologic salt solution by hypodermoclysis in three days following a prostatectomy. The whole blood chlorides in their patient reached 730 milligrams the day before death. The non-protein nitrogen was 75 milligrams and the creatinine was 2.3 milligrams. The autopsy revealed general edema, parenchymatous degeneration of the kidneys with early glomerular changes.

Gallie and Harris[7] state that prolonged use of the more dilute solutions of dextrose (5 and 10 per cent) will occasionally result in thrombosis and should not be given as a routine. They recommend the continuous intravenous administration of physiological salt solution and mention four simple precautionary measures to prevent clotting as follows: (1) The vein should be as small as will accommodate the needle in order to insure as rapid a flow as possible; (2) there should be no cessation in the flow of fluid as this permits blood to regurgitate into the cannula and clot there; (3) it is often useful to permit the fluid to run rapidly for a few minutes to insure a free channel; and (4) if the cannula does become plugged in spite of these precautions, it must be reinserted into another vein.

The presence of a foreign body, such as a needle or cannula, within the lumen of a vein predisposes to thrombosis. It is probable that the rate of flow of the solution and the size of the vein are also important factors. The experimental findings of Rumold support these statements.

The evidence collected from the literature on the subject of continuous infusions as a source of danger from infection and embolism, our own personal clinical observations and the experimental production of thrombosis and embolism have led us to discontinue the use of this method of intravenous therapy. As a substitute we are now giving daily intravenous infusions of 5 per cent dextrose alone or in Ringer's solution[8] not to exceed 2,000 cubic centimeters in twenty-four hours. This is supplemented by the same solutions plus novocaine given by hypodermoclysis in sufficient quantity to supply the need. The total quantity of fluid rarely exceeds four liters in twenty-four hours. This quantity is promptly reduced at the first sign of edema or kidney irritation.

It seems fair at this time to record the observation that only a few years ago there was a great tendency to undertreat dehydration while at present it is likely to be overtreated. The latter tendency has led to the indiscriminate use of intravenous infusions without thought or knowledge of their possible dangers. Such a valuable means of therapy should be standardized in so far as possible so that it may be generally used with the maximum of safety.

Conclusions

1. A more widespread knowledge of the fluid requirements of the ill patient is apparently needed.

2. The possible dangers of intravenous infusions are not sufficiently appreciated.

3. It is suggested as a safety factor that the use of continuous infusions be discontinued as a routine method.

4. The intermittent method of giving fluid, dextrose and sodium chloride by vein reduces the tendency to give too much fluid and lessens the likelihood of thrombosis and embolism.

5. Hypodermoclysis is a safer method of giving fluid than continuous phleboclysis.

Bibliography

1. Bower, J. O.: Unpublished data. Personal communication.
2. Bsteh, O., and Teichmann, M.: Fälle von Lungenembolie nach Injektionsbehandlung von Varikositäten. Zentrabl. f. Chir., 60:376, (Feb. 18) 1933.
3. Carlson, H. E.: Unpublished data. Personal communication.
4. Clark, J. H.: Acute cardiac dilatation. An ever present danger in intravenous injections. Jour. Am. Med. Assn., 89:21, (July 2) 1927.
5. De Takats, G.: Push Fluids—The surgeon's postoperative order. Am. Jour. Surg., 11:39, (Jan.) 1931.
6. Friedrich, H., and Buchaly, J. F.: Ist intravenöse Dauertropfinfusion mit Gefahren Verbunden. Zentralbl. f. Chir., 59:131, (Jan. 16) 1932.
7. Gallie, W. E., and Harris, R. I.: The continuous intravenous administration of physiological salt solution. Ann. Surg., 91:422, (March) 1930.
8. Horsley, J. S., and Horsley, G. W.: Continuous intravenous injection of dextrose in Ringer's solution. Arch. Surg., 22:86, (Jan.) 1931.
9. Matas, R.: The continued intravenous drip. Ann. Surg., 79:643, (May) 1924.
10. Ockerblad, N. F., and Carlson, H. E.: Unpublished data. Personal communication.
11. Orator, V., and Schleusing, H.: Thrombose und Hirnembolie infolge intravenöser Dauertropfinfusion. Zentralbl. f. Chir., 57:2530, (Oct. 11) 1930.
12. Rumold, M. J.: Experimental pulmonary embolism associated with venoclysis. Arch. Surg., 30:685, (April) 1935.
13. Strauss, L.: Thrombose und Lungenembolie nach intravenöser Dauertropfinfusion. Zentralbl. f. Chir., 59:909, (Apr. 2) 1932.
14. Tomarkin, J., and Strauss, A.: Venoclysis, dangers and contraindications. Am. Jour. Surg., 25:319, (Aug.) 1934.
15. Warthin, H. J.: Massive intravenous injections. Arch. Surg., 30:199, (Feb.) 1935.

PHENOLPHTHALEIN ERUPTIONS[*]

CARL W. LAYMON, M.D., Ph.D.

Minneapolis

PHENOLPHTHALEIN is a white or slightly yellow powder stable in air, nearly insoluble in water but freely soluble in alcohol. It is formed by the reaction of anhydrous phthalein (commercial form of ortho-phthalic acid, derived from naphthalene) and phenol in the presence of concentrated sulphuric acid. On the addition of alkalis, resulting in the production of sodium and potassium salts, its color becomes deep red due to structural transformations. The compound is thus given its property as an indicator.

Related substances such as resorcinphthalein and pyrogallolphthalein (which are produced by the reaction of phthalein and the phenolic compounds, resorcin and pyrogallol, respectively), the sulphonphthaleins, and the halogenphthalein derivatives are used widely in various branches of medicine as tests of liver and kidney function, indicators in colorimetry and other biochemical analysis, cholecystography, et cetera. The chemistry and various uses of the phthalein compounds were thoroughly discussed recently by Bruére.[4]

Phenolphthalein itself has been commonly employed as a cathartic in various forms for the past thirty years.

The usual dose in children is ½ to 1 grain and in adults 5 grains. As Kastle[12] stated, overdose may result in purgation, colic, dyspnea, palpitation, tachycardia and even collapse.

In 1908, Elmer[7] experimented with the drug in dogs and decided that its cathartic properties depended upon its irritating action on the intestinal mucosa. He found that 5 grains per pound of body weight caused only a moderate diarrhea without toxic effects in the animals and mentioned a patient who had taken 30 to 60 grains daily for fourteen months without harm. Elmer cited the opinions of Vamossey and Tunicliffe that phenolphthalein acted as a hydragogue cathartic due to increase in the osmotic pressure of the intestine. Vamossey found that 87 per cent of the drug was eliminated in the stools and that small amounts appeared in the urine only after large dosage.

---

[*] From the Division of Dermatology, University of Minnesota, H. E. Michelson, M.D., Director; and the Dermatology Service, Minneapolis General Hospital, S. E. Sweitzer, M.D., Chief.

Abel and Rowntree[1] also conducted extensive experiments on the pharmacologic action of phenolphthalein and stated that its toxicity was low.

Wood[28] was of a similar opinion after injecting the compound hypodermically and intravenously in dogs.

McWalter[17] reported no ill results in 1,000 doses of phenolphthalein, using 2 to 6 grains in adults and ½ to ¾ grain in children.

Orland[21] observed a child three years old who took 1.8 grams of phenolphthalein and suffered no more than a stomach ache and diarrhea. The drug was recovered from both the urine and stool though the greatest part of the excretion was through the feces.

On the other hand, Hydrick[11] observed albuminuria in twenty patients who had taken 1 to 2 grains of phenolphthalein.

Furbinger[9] reported a case of severe poisoning from laxative drops containing phenolphthalein. Six-tenths gram of the latter drug caused severe diarrhea, vomiting, cyanosis, palpitation, tachycardia, and anuria. Later, casts and albumin were found in the urine. He mentioned similar cases observed by Schwartz, Blumenthal and Zabel.

Rosenstein[24] described the case of a female who developed diarrhea and hemorrhagic nephritis following the ingestion of anti-fat remedy containing the drug.

Martinson,[18] in 1924, treated a similar case in a child who suffered an acute toxic nephritis and anemia which lasted for two months, and which was caused by "Boal's Rolls" containing phenolphthalein.

This drug is contained in varying amounts in a multitude of patent medicines usually used as cathartics. Its mild action and non-irritating qualities have increased its popularity, hence it is used extensively. Ex-Lax, Feen-a-Mint, and Phenolax are examples of the most widely used preparations containing phenolphthalein. Wise and Sulzberger[27] brought out that the drug also may be embodied in other vehicles such as: (1) certain mouth washes and lotions of a pink or reddish color; (2) most sodium perborate (aromatized) preparations for use in the mouth and for douches; (3) possibly some tooth pastes and (4) pink cake icings in certain instances. Thus it may be seen that the possibility of contact with phenolphthalein is extremely difficult to exclude when the drug is suspected as a cause for a certain dermatosis. Wise and Sulzberger believe that small amounts of the drug may be absorbed from mouth washes through the mucous membrane.

Eruptions Due to Phenolphthalein

The first formal article devoted to the subject was written by Wise and Abramowitz,[26] in 1922. This included a review of previously observed examples of the condition and a thorough clinical and histologic study of five cases in addition to a discussion of the toxicology and proprietary remedies containing the drug.

Previously, in 1918, Abramowitz[2] reported five cases of persistent erythema multiforme, one of which was definitely thought to be caused by phenolphthalein at the time of the report. Further study showed that all were in reality manifestations of phenolphthalein idiosyncrasy.

Within a period of a few years (from 1916 to 1920) several other cases of phenolphthalein eruption were presented before dermatologic societies as erythema multiforme and iris (McKee and Wise[14]), erythema multiforme perstans (McKee and Wise[15]), erythema maculatum perstans (McKee and Wise[16]), erythema perstans (H. Fox[8]), recurrent erythema multiforme (Harris[10]), and dermatitis medicamentosa (Rosen[22]).

Among more recent contributions to the subject were those by Novy,[20] and Wise and Sulzberger.[27]

The cutaneous lesions most frequently evoked by phenolphthalein are identical with the comparable "fixed" eruptions produced by antipyrin. The eruption as a rule consists of pink, dusky red or deep purple plaques situated anywhere on the body but most commonly over the lumbosacral region or proximal portions of the extremities. Upon involution of the active lesions, dark brown, slightly scaly patches remain for several weeks or even months. Wise and Abramowitz observed palmar and plantar lesions.

Ayres[3] reported an eruption limited to the face which was caused by "Phenolax." The lesions were multiple, pin head to dime in size, at first pink and later yellow resembling verruca plana.

Corson and Sidlick[6] observed a patient with urticaria caused by phenolphthalein contained in a patent medicine "Carbolax with Cocoa." The patient treated by Levin[13] presented similar lesions caused by "Partola."

Campbell[5] reported a bluish staining of the lunulæ of the finger nails of both hands which was evoked by "Ex-Lax."

Erosive and bullous mucous membrane lesions are also relatively frequent, occurring on the lips, tongue, mucosa of the cheeks or genitals. Early syphilis, pemphigus or erythema multiforme may be mimicked by these lesions.

Rosenbloom[23] reported a case of recurrent nasal herpes caused by phenolphthalein in "Alophen" pills. The eruption disappeared upon discontinuing the drug.

Silberstein[25] observed a patient who presented plaques on the tongue, bullous stomatitis and herpetic lesions on the penis caused by phenolphthalein. He was also called to see a patient who suffered with hemorrhagic lesions in the eye following the ingestion of "Ex-Lax."

Abramowitz,[2] and Wise and Abramowitz[26] also cited various examples of the different manifestations of idiosyncrasy to phenolphthalein.

Histology

(Dr. H. E. Michelson)

The histology of phenolphthalein eruptions varies directly with the acuity of the clinical manifestations. It is essentially an acute inflammation involving the epidermis and upper portions of the cutis and has no characteristics which are pathognomonic. The epidermis seems to bear the brunt of the insult and I have seen all degrees of destruction. In the more severe cases there is almost complete separation of the epidermis from the cutis which is brought about by inflammation and edema of the upper portion of the cutis. In the macular lesions there are areas of parakeratosis alternating with lamellar hyperkeratotic scales. All of the layers of the epidermis take part in the process. There is both inter- and intracellular vesicle formation and there are degenerative nuclear changes particularly in the granular layer. In the vesicular as well as in the macular lesions the basal layer is disrupted, its continuity being broken and some of the pigment bearing cells being carried into its upper portions. There is no marked increase in the pigment content of the individual basal cells. The infiltrate in the cutis is about the same in all types of the eruption, varying only in degree. It is made up of lymphocytes and polymorphonuclear leukocytes arranged in rather massive collections and about dilated small vessels. There is definite edema especially near the basal layer. In some instances there is a horizontal layer of infiltrate directly beneath the basal membrane. Large chromatophores may be seen scattered throughout the cutis. Although the general picture is much the same as that of erythema multiforme it is my impression, gained from the sections of phenolphthalein eruption which I have examined, that the epidermis is more disturbed than in erythema multiforme.

Mechanism

Phenolphthalein eruptions are of course examples of drug allergy though the exact location of the hypersensitiveness is not known. Wise and Sulzberger[27] found that both patch and intradermal tests were negative in their experimental studies of phenolphthalein idiosyncrasy.

In further experiments with autogenous, full thickness skin grafts it was found that normal skin grafted upon previously affected areas reacted with the formation of a typical lesion after ingestion of the drug, while previously affected skin, grafted onto a previously normal site remained unaffected. These results were exactly opposite to those of Naegeli[19] and his coworkers.

Based on their own work, Wise and Sulzberger believed that the hypersensitive or shock tissue involved deeper structures such as blood vessels and nerves rather than the epidermis or superficial cutis.

Novy concluded after a series of experiments that reactions to phenolphthalein were due to the substance as a molecule rather than split products or chemical impurities. Perhaps the further observation and study of examples of phenolphthalein and other drug eruptions will some day offer a solution to the now existing riddles of this type of allergy.

Case Reports

Case 1.—G. E., female, aged thirty-one, had repeated attacks of acute, erythematous maculo-papular lesions on the hands, forearms, neck and thighs since October, 1934. There were associated bullous lesions in the mouth. On questioning, the patient stated that the evening before each attack she had taken "De Witts Early Risers" as a cathartic. During the period of observation she was given a three grain tablet of phenolphthalein, which precipitated another attack of the eruption. There was no family history of allergic disease and the patient had no other drug or food idiosyncrasies. A biopsy showed no unusual histopathologic findings. The microscopic picture was consistent with a diagnosis of phenolphthalein eruption.

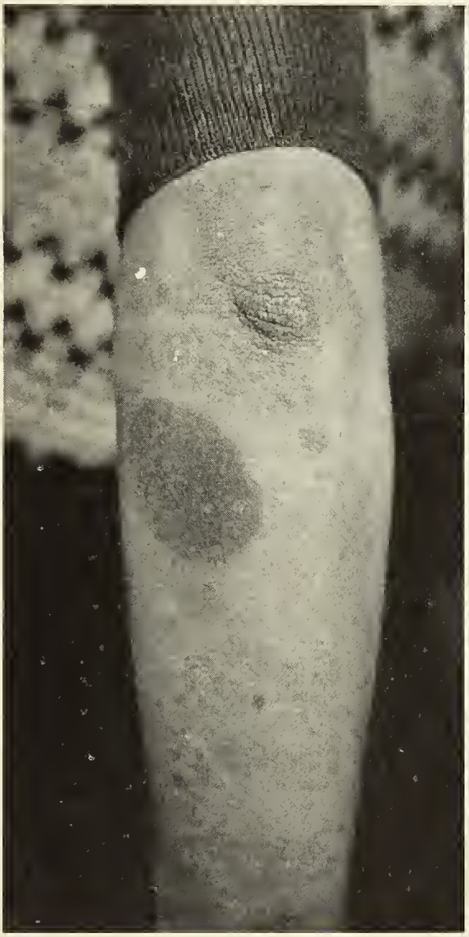


Fig. 1. Case 1. (See text.)

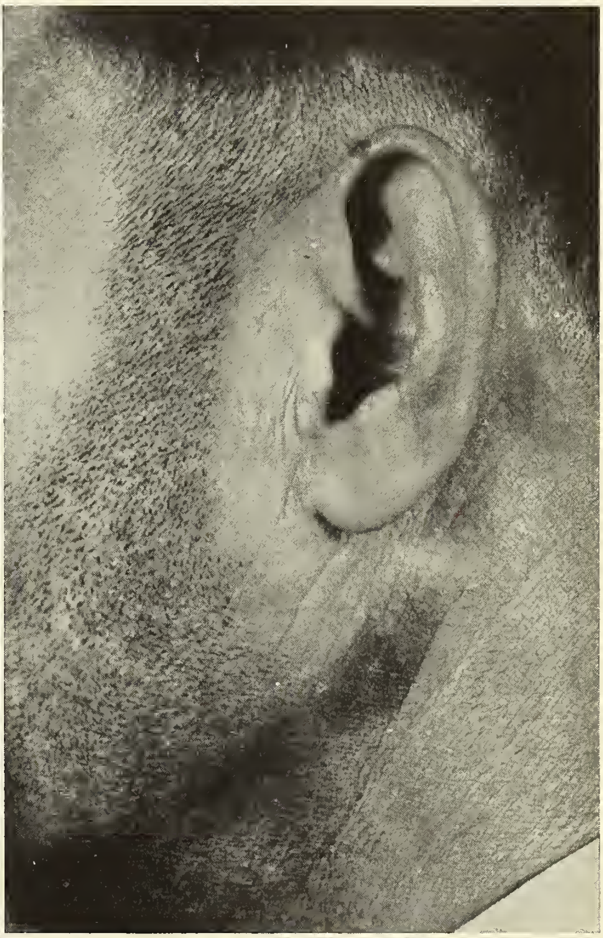


Fig. 2. Case 2. (See text.)

Case 2.—F. C., male, aged forty-five, had eruption on the face, hands, and wrists on several occasions over a period of two months, appearing each time after taking "Ex-Lax." The lesions were the violaceous plaques considered characteristic of phenolphthalein eruption. Except for the present complaint the patient had no other allergic disorders. The eruption was reproduced by giving the patient 3 grains of phenolphthalein. The following tests were performed:

	Normal skin	Affected skin
Scratch	neg.	neg.
Patch (after 24 hours)	neg.	neg.
Passive transfer	The patient's serum was injected intradermally into two normal controls. The later ingestion of the drug by the controls caused no eruption at the sites of the injections.	

The microscopic findings in this case were in accord with those which were previously outlined by Dr. Michelson.

Summary

1. The chemistry, toxicology, and sources of phenolphthalein in various forms are briefly reviewed.
2. The clinical and histologic appearances of phenolphthalein eruptions are presented. The exact mechanism of this type of drug idiosyncrasy is not yet known.
3. Two cases of characteristic phenolphthalein eruptions are reported.

Literature

1. Abel, John J., and Rowntree, L. G.: On the pharmacological action of some phthaleins and their derivatives, with especial reference to their behavior as purgatives. Jour Pharmacol. and Exper. Therap., 1:231, 1909.
2. Abramowitz, E. W.: Erythema multiforme associated with cutaneous pigmentation (melanin). Clinical and pathological report of five cases. Jour. Cut. Dis., 36:11, 1918.
3. Ayres, Samuel, Jr.: Phenolphthalein dermatitis. Jour. A. M. A., 77:1722, 1921.
4. Bruére, M.: Applications therapeutiques, cliniques et biochemiques des phthaleins, des sulphonesphthaleins et de leurs dérivés halogénés. Arch. de med. et pharm. milit., 88:289, 1928.
5. Campbell, C. Gordon: Peculiar pigmentation following the use of a purgative containing phenolphthalein. Brit. Jour. Dermat. and Syph., 43:186, 1931.

6. Corson, E. F., and Sidlick, D. M.: Urticaria from the habitual use of phenolphthalein. Jour. A. M. A., 78:882, 1922.
7. Elmer, Warren Philo: The action and dosage of phenolphthalein. Med. Rec., 74:838, 1908.
8. Fox, H.: Erythema perstans following use of phenolphthalein (Case presentation). Jour. Cut. Dis., 36:252, 1918.
9. Furbinger: Schwere Vergiftung durch Laxative-Drops (Phenolphthalein). Deutsche med. Wchnschr., 43:842, 1917.
10. Harris, Fred: Melanoderma from recurrent erythema multiforme (Case presentation). Jour. Cut. Dis., 37:258, 1919.
11. Hydrick, J. L.: Albuminuria following the ingestion of phenolphthalein. Proc. Am. Soc. Biol. Chem., 1914, p. 36.
12. Kastle, J. H.: Conduct of phenolphthalein in the animal organism. Hyg. Lab. Bull., 21-29-23, 1905.
13. Levin: Erythema perstans (phenolphthalein) (Case presentation). Arch. Dermat. and Syph., 6:230, 1922.
14. McKee and Wise: Erythema multiforme and iris (Case presentation). Jour. Cut. Dis., 34:846, 1916.
15. McKee and Wise: Erythema multiform perstans (Case presentation). Jour. Cut. Dis., 25:554, 1917.
16. McKee and Wise: Erythema maculatum perstans (Case presentation). Jour. Cut. Dis., 36:190, 1918.
17. McWalter, J. C.: 1,000 Doses of phenolphthalein. Lancet, 2:1141, 1915.
18. Martinson, Herman: Toxic nephritis. Arch. Peds., 41:578, 1924.
19. Naegeli, de Querwain, and Stalder: Cellulaerer Sitz der Allergie beim fixen Antipyrin Exanthem. Klin. Wchnschr., 9:924, 1930.
20. Novy, Frederick G., Jr.: Phenolphthalein eruption. Experimental data on its causation. Arch. Dermat. and Syph., 26:125, 1932.
21. Orland: Ein Fall von unbeobsichtiger hoher Phenolphthaleindosis bei einem Kinde. Med. Klin., 9:257, 1913.
22. Rosen, I.: Dermatitis medicamentosa (Case presentation). Arch. Dermat. and Syph., 1:355, 1920.
23. Rosenbloom, J.: Report of case of nasal herpes due to ingestion of phenolphthalein. Jour. A. M. A., 78:967, 1922.
24. Rosenstein, Paul: Der Unfug mit Phenolphthalein. Münch. med. Wchnschr., 67:263, 1920.
25. Silberstein, Leo: Der Phenolphthalein. Unfug. Therap. Halbmonatsh., 34:306, 1920.
26. Wise, Fred, and Abramowitz, E. W.: Phenolphthalein eruptions. Arch. Dermat. and Syph., 5:297, 1922.
27. Wise, Fred, and Sulzberger, Marion B.: Drug eruptions. I. Fixed phenolphthalein eruptions. Arch. Dermat. and Syph., 27:549, 1933.
28. Wood, Horatio C.: The use of phenolphthalein as a cathartic. Rec. Philadelphia Gen. Hosp., 7:183, 1909.

THE EXTERNAL FRONTO-ETHMO-SPHENOID OPERATION

A Critical Review of the Literature and Details of the Technic in Use at The Mayo Clinic

HAROLD I. LILLIE, M.D., and HENRY L. WILLIAMS, M.D.

Rochester, Minnesota

Owing to the recent increase of interest in the external approach to the upper group of paranasal sinuses, it was thought that a critical review of the literature as well as a presentation of the technic that seems most satisfactory to us at The Mayo Clinic might be of interest.

In 1893, Jansen published his paper on, "Opening the Paranasal Sinuses in Chronic Suppuration," basing his operation on the surgical principles advocated by Küster for the treatment of suppuration in rigid walled cavities. He described a curved incision, extending along the brow from the supra-orbital notch to the inner end of the brow, and then downward around the inner canthus of the eye. The periosteum was elevated over the anterior segment of the orbital wall and the floor of the frontal sinus. The frontal sinus was then entered through the floor at the medial angle and the floor of the frontal sinus removed. Jansen particularly stressed the removal of the fronto-ethmoid and infundibular cells, giving as his opinion that the frontal sinus was never involved without the simultaneous involvement of these groups of cells. He then advanced posteriorly as far as the inflammatory condition in the anterior and posterior ethmoid sinus extended, and he opened the sphenoid sinus if it was also involved.

In 1906, Ritter described what he reported to be the Jansen technic, and he added an original technic for turning the anterior wall of the sinus lateralward as a bone flap.

In 1921 and 1929, Lynch described the technic of a radical operation on the frontal sinus patterned after that described by Knapp and made some noteworthy suggestions. He insisted that the periosteum be elevated only from the lower half of the incision, stating that if the periosteum were elevated over the frontal plate of the frontal bone, it was not likely to reapply itself to the bone again, and in consequence there would develop, either immediately or in three months, a periostitis with elevation, and a sequestrum of more or less good size would be cast off. After removing the floor of the frontal sinus, he stressed the importance of obliterating the angle formed by the orbit, or sinus wall of the floor of the frontal sinus, with its posterior or brain wall, especially at the external angle, for he said, "This is the area that most often harbors the infected mucous membrane that causes failure." He then carefully removed the entire common sinus orbital wall. The mucous membrane of the sinus was carefully curetted away, as it was his opinion that any remaining mucous membrane, degenerated or not, would conduce to failure. He then removed the nasal process of the superior maxilla, the lower lateral edge of the nasal bone, and the lacrimal bone which, with the removal of the entire lamina papyracea of the ethmoid bone resulted in complete evisceration of its cellular structures. The fovea frontalis was then carefully freed from any remaining cell walls and the mucous membrane was meticulously removed. Because of the difficulty he experienced with collapse medialward of the soft parts of the orbit, shutting off drainage, a rubber tube ⅛ inch (0.3 cm.) in diameter was placed in the region of what was the beginning infundibulum of the sinus.

---

*From the Section on Otolaryngology and Rhinology, The Mayo Clinic, Rochester, Minnesota. Read before the meeting of the Minnesota Academy of Otolaryngology at Rochester, Minnesota, April 12, 1935.

In 1926, Sewall published a paper on, "The External Operation on the Ethmo-Sphenoid Frontal Group of Cells Under Local Anesthesia." He introduced an excellent method of local anesthesia and advocated the small skin incision medial to the inner canthus. In a later paper, because of great difficulty in preserving the frontonasal opening after removal of the frontal process of the superior maxilla, Sewall[11] modified his procedure to retain a portion of the lacrimal bone and frontal process as an osteoplastic flap. He also described an original technic for tying the anterior and posterior ethmoid vessels and the sphenopalatine artery. He was also the first to advocate removal of the floor of the sphenoid sinus in cases in which the sinus was very deep and the downward slope of the floor interfered with drainage.

Smith,[13] in his paper published in 1934, adopts the method of anesthesia, type of incision, method of ligating the vessels, and removal of the floor of the sphenoid sinus advocated by Sewall, but otherwise he follows very closely the technical procedures suggested by Lynch, especially as to removing the angle between the posterior and inferior walls of the frontal sinus and as to meticulously removing the lining membrane here and in the ethmo-sphenoid region. He has added the technical procedures of wiping off the adherent membrane with gauze balls dipped in 5 per cent picric acid and 35 per cent acetone solution and covering the tube inserted into the frontal sinus with a skin graft, with the raw surface out, in an attempt to maintain the patency of the opening.

At the clinic, the external method of opening the superior group of sinuses was adopted in selected cases soon after the publication of Lynch's paper, and a small group of cases was reported in 1927. These were all cases with external manifestations and, unfortunately, in the one case in which local anesthesia was used orbital cellulitis developed, which had the effect of causing us to avoid this method of anesthesia for some time.

It was observed that the falling in of the soft tissues had a tendency to produce closure of the nasofrontal opening, and it occurred to one of us (Lillie) that if the frontal process of the superior maxilla was preserved it would prevent this tendency. This detail was consequently adopted and since that time we have experienced much less difficulty in maintaining the patency of the frontonasal opening. Lillie and Anderson stressed this detail in advocating the two-stage operation for chronic suppuration of the frontal group of cells, and they also pointed out that when an adequate intranasal operation was possible, the condition cleared up without further procedures being necessary. This point was also emphasized in Anderson's paper in 1928.

We believe Sewall's osteoplastic flap to be in all ways a better method than the insertion of an epithelial graft into the nose, especially when the lining mucous membrane has been entirely removed. Smith[14] admitted failure of his skin graft method in 10 per cent of the cases in which it had been used, and the percentage may be higher, as Sewall points out that many patients may be symptom-free for long periods even when no communication can be found between the frontal sinus and the nose. Another danger might be pointed out in the use of epithelial grafts in the nose. We have observed the formation of a cholesteatoma in the maxillary sinus in a case in which a skin graft was used to replace the lining membrane elsewhere. While this method has had too short a use in the frontal region as yet to produce this complication, we feel that there is a great danger of this complication appearing as time passes.

In insisting on complete removal of diseased and normal membrane in the angle, we feel that Lynch incorrectly interpreted the factors producing late complications. In a paper on postoperative complications following the radical external operation on the frontal sinus, one of us (Lillie) pointed out that in certain cases in which the frontal sinus extended far lateralward, leaving a cellular extension at the level of the opening of the frontonasal duct, the upward bulging of the orbital contents after the Lynch type of operation had a tendency to form a pocket without free drainage. If mucous membrane is left in such a situation, its natural tendency to secrete is likely to result in the production of a mucocele. We feel that Lynch interpreted this phenomenon as a pathologic rather than as a physiologic effect, and that this paralogism applied to the mucous membrane as a whole convinced him of the necessity of its total extirpation. If his reasoning were correct, it is our opinion that the Jansen type of operation would be doomed to failure, because it is obviously impossible to remove entirely the mucous membrane in the cleft superiorly between the anterior and posterior walls of the frontal sinus, where the walls run very close together for a considerable distance, whether the mucous membrane is previously loosened by packing the sinus with gauze dipped in picric acid solution or not. If it were desirable to remove this membrane, Ritter's technic would be necessary. In our experience mucous membrane need be removed only in those locations where drainage cannot be secured and a mucocele might result.

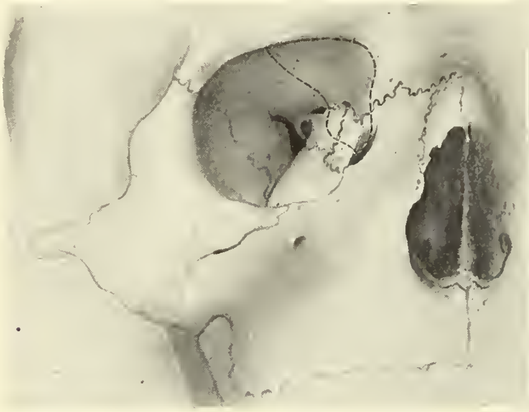


Fig. 1. Portion of bone removed to enter frontal sinus.

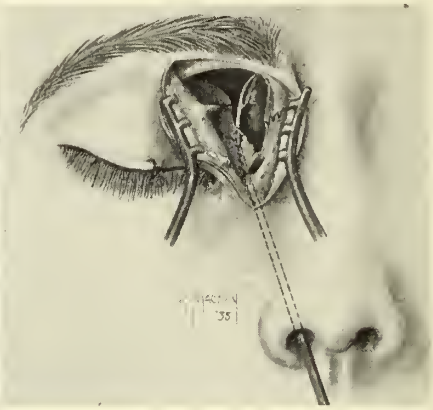


Fig. 2. Method of removing agger cells by curetting from above downward.

In advising the external operation our requirements are very selective. We fail to agree with the dictum of Skillern as to the ineffectiveness of the intranasal approach in eradicating disease in the ethmoid sinuses, and indeed we find that by our intranasal technic the results frequently are excellent. We believe that an adequate intranasal technic requires considerable experience, skill, and anatomic knowledge, and that in inexperienced hands the external approach should be the favored method of attack. After the operator has familiarized himself with the relationships by the external route he is better prepared to handle the more difficult intranasal technic. We, therefore, do not distinguish these technics as radical and conservative, as both are radical in the proper sense of the word, in that they relieve the source of the disease when they are properly performed.

We require first that disease of the frontal and ethmoid sinuses together be definitely established clinically. Roentgenologic diagnosis alone is considered insufficient evidence of present disease, and we have not found patients subjectively relieved either as to local or general symptoms when identification of disease depended on especially refined methods of diagnosis. Proper diagnosis requires sufficient time for definite identification of the source of suppuration, with thorough investigation of all the cell groups. When investigation has been thoroughly carried out, we decide on an intranasal or external approach on the further grounds of whether there is evidence of groups of cells present which will be difficult or impossible to reach by the intranasal approach, or whether so much osteosclerosis has been created either by disease or by previous operation that the intranasal technic is made impossible without the use of dangerous force.

The cellular structures recognized as difficult to open intranasally are a flat group of cells lying along the lamina papyracea and the infraorbital group described by Sewall. Judgment as to the amount of sclerosis making necessary the external approach is influenced somewhat by the skill and experience of the operator in the intranasal technic. The two-stage operation is still favored, as oftentimes patients are "cured" without recourse to the external operation. The technic used at present has evolved from the technic as advocated by Lynch, with such additions as seemed advisable. Individualization of the case as a surgical problem is stressed.

Technic

Our preoperative technic and method of anesthesia are essentially those described by Sewall. We prefer the incision recommended by Jansen, as we find the cosmetic result equally good and the exposure much better with the longer incision. We do not find that total removal of the lining membrane of the frontal or ethmoid cells is necessary for a good postoperative result, and we remove only the lining membrane from the lateral extension of the frontal sinus if it seems probable that the soft tissues of the orbit will bulge upward to close off this portion of the sinus and produce a mucocele. We can see no merit in a time-consuming technic, however interesting in itself, which produces no effect toward the well-being of the patient.

The chief, and we believe the most important, difference in our technic from the previous descriptions is in our treatment of the frontal process of the superior maxilla (Fig. 1). The nose is entered through the floor of the lacrimal fossa, and the bone over the anterior ethmoid cells is removed posteriorly, widely enough to admit the Lillie modification of Kerrison's mastoid rongeur. The floor of the frontal sinus is removed with this instrument, care being taken not to remove any portion of the frontal process of the superior maxilla which will later hold the tissues of the orbit from collapsing into the frontonasal opening. The agger nasi cells are removed by curetting forward between the frontal process of the superior maxilla and the septum (Fig. 2). Our procedure is otherwise essentially that described by Sewall.

Bibliography

1. Anderson, C. M.: The Lynch type of radical frontal sinus operation. Minnesota Med., 11:461-464, (July) 1928.
2. Jansen, A.: Zur Eröffnung der Nebenhöhle der Nase bei chronischer Eiterung. Arch. f. Laryngol. u. Rhinol., 1:135-157, 1894.
3. Knapp, A. H.: A case of extensive chronic empyema of the frontal and ethmoidal sinuses with exophthalmos; operation; recovery. Arch. Ophth., 28:50-54, 1899.
4. Küster, E.: V. Über die Grundsätze der Behandlung von Eiterungen in starrwandigen Höhlen, mit besonderer Berücksichtigung des Empyems der Pleura. Deutsch. med. Wchnschr., 15:233-236, (Mar. 21) 1889.
5. Lillie, H. I.: Postoperative complications of the radical external operation on the frontal sinus. Arch. Otolaryngol., 14:793-796, (Dec.) 1931.
6. Lillie, H. I., and Anderson, C. M.: The two-stage operation for suppurative frontal sinusitis with external manifestations. Arch. Otolaryngol., 5:152-161, (Feb.) 1927.
7. Lynch, R. C.: The technic of a radical frontal sinus operation which has given me the best results. Laryngoscope, 31:1-5, (Jan.) 1921.
8. Lynch, R. C.: Ethmoidal sinusitis, external radical approach. Tr. Am. Acad. Ophth. and Oto-Laryngol., 438-445, 1929.
9. Ritter, Gustav: Eine neue Methode zur Erhaltung dervorderen Stirnhöhlenwand bei Radikaloperationen chronischer Stirnhöhleneiterungen. Deutsch. med. Wchnschr., 2:1294-1296, (Aug. 9) 1906.
10. Sewall, E. C.: External operation on the ethmosphenoid-frontal group of sinuses under local anesthesia. Arch. Otolaryngol., 4:377-411, (Nov.) 1926.
11. Sewall, E. C.: Frontal ethmosphenoidectomy. Experience with this operation under local anesthesia; a new osteoplastic flap. Arch. Otolaryngol., 8:144-150, (Aug.) 1928.
12. Skillern, R. H.: Quoted by Smith.[13]
13. Smith, Ferris: Management of chronic sinus disease. Arch. Otolaryngol., 19:157-171, (Feb.) 1934.
14. Smith, Ferris: Personal communication to Dr. Lillie.

THE RADIUM TREATMENT OF NONMALIGNANT CONDITIONS*

ROBERT E. FRICKE, M.D.†

Rochester, Minnesota

NO BRANCH of medicine has developed so rapidly and surely as therapeutic radiology during its brief span of about thirty-five years. The use of radium in the treatment of disease is increasing with the increase in our knowledge of disease and of the reaction of the tissues to irradiation with gamma rays. Importations of radium into the United States for medical purposes have been steadily increasing; during the past decade nearly a third of a pound, costing more than $6,000,000, has been purchased from abroad, and the heaviest importations have been since 1929.[4] This testifies to the intensive interest in radiology in this country, as the world's supply today is approximately only 1¾ pounds or 700 gm. Of this world total of 700 gm., about 238 gm. are in use in the United States in 287 hospitals and in the private possession of about 400 physicians.

---

*Read at Joint Meeting of the American Therapeutic Society and the Atlantic County Society at Atlantic City, New Jersey, June 7, 1935.

†From the Section on Therapeutic Radiology, The Mayo Clinic, Rochester, Minnesota.

This small world's supply of radium is in constant use against mankind's arch enemy, cancer. Radium, roentgen rays, and surgery form the combination best fitted to cope with malignant disease, which is so widespread that it ranks second to heart disease as a cause of death.

The hindrance to the development of radium treatment has been the high cost of the element. This, of course, is due to its scarcity, the tremendous cost and lengthy process of its extraction, and to the fact that monopolies have been able to maintain the price over long periods. From 1912 to 1926, the United States furnished most of the world's radium at prices varying from $170,000 to $120,000 per gram. Since 1926, the far richer ores of the Belgian Congo have gradually dropped the price to $50,000 per gram, completely halting production in the United States. At the present time, development of still richer fields in Canada, discovered in 1930, offers promise of cheaper radium and the hope for greater supplies for medical use.

In my opinion, as more radium becomes available, future development in medical radiology will center in the treatment of non-malignant conditions. Up to the present, most of the world's radium supply and the attention and skill of radiologists have been devoted to treatment of the more urgent malignant lesions. A start has been made in this direction, however, as many types of benign lesions are now being successfully treated with radium and more experience is gradually developing in this field.

I have analyzed the cases in which patients were treated with radium at The Mayo Clinic during the past several years, and it is interesting to note that 30 to 33 per cent of the total number of patients treated with radium each year have been treated for non-malignant conditions. In this paper a study was made of patients with non-malignant conditions, who were treated with radium in 1934 at the clinic (Tables I and II). Two hundred fifty-three patients, with fourteen types of non-malignant disease, received radium treatment during that year; some of the more common conditions treated will be discussed briefly and some of the principles and difficulties encountered in radium therapy will be mentioned.

TABLE I. PATIENTS WITH NONMALIGNANT CONDITIONS TREATED BY RADIUM DURING 1934

	Patients Treated			Type of Treatment		
	New	Old	Total	Complete	Limited	Total
Actinomycosis	6		6	8		8
Adenomyoma	4		4	4	1	5
Conjunctivitis	4	4	8	11		11
Erythromelalgia	2		2	1	1	2
Hemangioma	32	17	49	72	2	75*
Hygroma, cystic	2	3	5	7		7
Inflammatory conditions	5	1	6	2	4	6
Keloids	20	10	30	34		35*
Keratoses	2	1	3	3		3
Lymphangioma	2	3	5	7		7
Lymphedema of face	3	1	4	4		4
Menorrhagia	83	2	85	85		85
Parotitis, acute	30		30	27	1	30†
Verruca	6		6	7		7
Miscellaneous	9	1	10	11		11
Total	210	43	253	283	9	296

*Includes one patient who received prophylactic treatment.
†Includes two patients who abandoned treatment.

TABLE II. EARLY RESULTS BASED ON CLINICAL IMPRESSIONS AT RETURN VISITS

	1933		1934	
	Number	Per cent	Number	Per cent
Cured	4	4.9	4	3.8
Clinically cured	7	8.5	16	15.4
Improved	71	86.6	79	76.0
Unimproved	0	0	5	4.8
Died	0	0	0	0

Menorrhagia

Eighty-five patients were treated with radium during 1934 for menorrhagia of the menopause, whether caused by small uterine fibroids or ovarian dysfunction. The intra-uterine application of radium for benign hemorrhage of the menopause is safe and dependable, and the method is practically specific. The almost universal good results are so well known as to need no comment. A review of 295 cases in which patients who were treated at the clinic in 1926 and 1927 were traced, revealed only 2.02 per cent of failures.[1] Cases, however, must be carefully selected; the presence or past history of pelvic inflammatory disease contraindicates the intra-uterine application of radium as it also does any minor surgical treatment of the cervix. A recent report emphasizes the danger of peritonitis and death in these cases following as harmless a procedure as cauterization of the cervix.[3] When a suspicious history of pelvic inflammatory disease is obtained, vaginal radium treatment and teleradium or roentgen therapy over the ovarian regions is a safe procedure. Functional menorrhagia of women below the age of menopause should be treated cautiously with small or moderate doses of radium if other medical measures have failed.

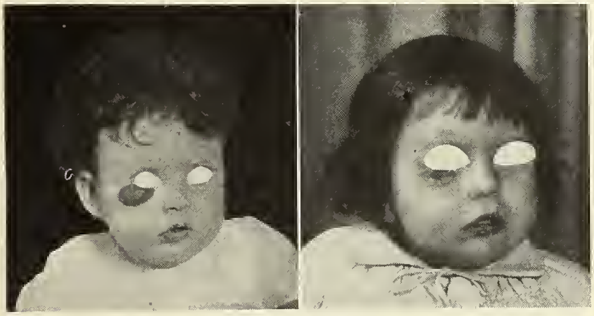


Fig. 1. Cavernous hemangioma: *left,* before treatment; *right,* after two applications of radium.

If menorrhagia is attributable to uterine fibroids, radium or roentgen treatments afford perfect results in well-selected cases. Diagnostic curettage should be performed to exclude carcinoma of the fundus, and the radium applicator is best introduced at this procedure. There are several contraindications to the intra-uterine treatment of fibroids with radium, and these are the cases in which surgery is preferable. Subperitoneal fibroids are often too far from the uterus to be sufficiently affected by the rays, and submucous fibroids are best treated surgically because of the slough and infection that may follow radium treatment. Fibroid tumors, large enough to cause pressure symptoms had best be excised, as shrinkage of the tumor, following radium treatment, is gradual and often requires months. Fibroid tumors that grow rapidly, or are soft and degenerating, should be treated surgically; patients with a history of pelvic inflammatory disease should be operated on or receive vaginal radium treatments and teleradium or roentgen therapy. If these contraindications are observed, the results should be satisfactory in 85 to 90 per cent of the cases.[7]

Hemangioma

Forty-nine patients with hemangioma were treated during 1934. This condition is congenital and the best results from treatment are obtained in infancy. Treatment is important in order to forestall hemorrhages from lacerating injuries and the possibility of malignant degeneration later in life. The simple vascular hemangiomas and the small, cavernous types yield excellent results (Fig. 1). The treatment is tedious to apply, is given cautiously, and usually requires three or four, or more, applications at intervals of from three to four months. The endarteritis and fibrosis resulting from treatment of a hemangioma leads to the formation of flattened, pale scar tissue. Plaque treatment is used, yielding considerable beta radiation, and if the tumor extends much below the surface of the skin, screened radium at a distance is also applied. The results of treating "port wine marks" are not good and treatment of this type of condition is not urged; however, considerable improvement may occur with use of the radium plaque kept moving over the surface of the tumor.[6,8]

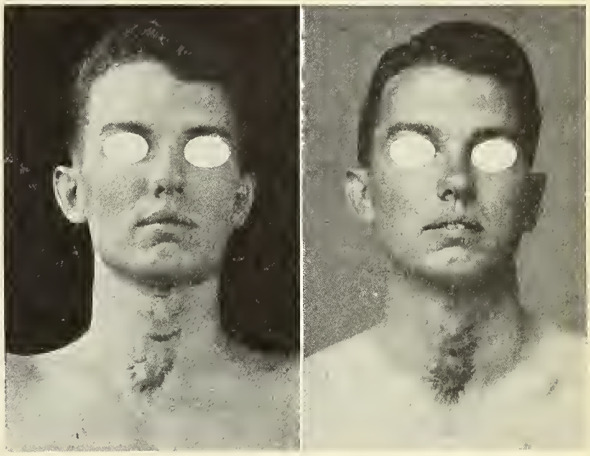


Fig. 2. Extensive keloid: *left,* before treatment; *right,* after only one application of radium.

Keloids

Thirty patients with keloids received treatment during 1934; the results in most cases proved excellent (Fig. 2). Very heavily-filtered radium is used, employing 2 mm. of lead, and the tubes are fastened directly to the lesion with adhesive tape. Usually one or two treatments suffice; the unsightly lesions diminish and their color fades, and the stinging and burning sensations are alleviated.

Acute Parotitis

This is one of the serious complications of major operations, especially following those on the gastro-intestinal tract. Unilateral or bilateral infections of the parotid gland of these patients who are debilitated by the serious operation is a dangerous condition. Rankin and Palmer, reviewing a small series of cases at the clinic, found a mortality of about 40 per cent when patients were not treated by radium. This mortality dropped to 5 per cent when radium treatments were applied. The essential factor in successful treatment is early application; radium surface packs are applied, day or night, at the first evidence of swelling of the gland. The radium element tubes, containing 50 mg. of radium sulphate, filtered with 2 mm. of lead, are applied at a distance of 1 inch (2.5 cm.) from the skin, and only a moderate dose is given. The entire parotid region is fully covered by the treatment, usually in two applications. Radium treatment tends to abort suppuration; when suppuration does occur and surgical incision is necessary, the mortality is much greater.

Principles of Treatment

The exact mode of action of the beta and gamma rays in benign disease is not quite so clear cut as in malignant conditions; in the latter we have a specific lethal effect of the rays on the cancer cells. However, a great deal has been learned regarding the specific sensitiveness of the various tissues of the body to irradiation. The favorable action of radium on acute parotitis has been mentioned. Roentgen or radium therapy has proved very effective in other acute or chronic inflammatory processes, such as carbuncles, boils, erysipelas, tuberculosis, actinomycosis, and so forth. Considering acute conditions, one plausible theory has been advanced by Desjardins. In the presence of an inflammatory reaction, the bodily defenses quickly erect a barrier of leukocytes to check and kill the invading organisms. Gamma rays and roentgen rays destroy leukocytes, especially lymphocytes, and hence break down this barrier. Strange to relate, however, the suppurative process, if treated early, is aborted and resolves. It seems reasonable to suppose, therefore, that the destroyed leukocytes liberate whatever protective lytic agents and antibodies they may contain, and that these combat the infection rapidly and surely. Gamma rays and roentgen rays are bactericidal in vitro but not in tissues in the therapeutic dosage usually used. In chronic inflammation, fibrosis is produced and serves to wall off the offending organisms, as in tuberculosis of the skin and lymph nodes and in actinomycosis.

The dangers and risks of the radium treatment of benign conditions are serious. Overdosage or underfiltration may produce intractable skin lesions which can only be treated by widespread excision; very slow to heal, these lesions may undergo malignant changes. Nothing more disastrous can be imagined than treating a simple benign condition and, by such treatment, producing a cancer. However, as a rule, this can happen only through gross carelessness or ignorance in applying treatment, as the dosage of radium employed for benign lesions is moderate and is only a fraction of that used in the treatment of malignant lesions. This fortunate fact permits a large margin of safety. Enough has been stated about these various benign lesions to indicate that there is no set formula as to dosage for each condition. Each lesion is an entity requiring special study and experience for its successful treatment.

Summary and Conclusions

The value of radium as a therapeutic agent is widely recognized, especially in this country, and especially in recent years. The heaviest importations of radium have been made since 1929.

At present, the supply of radium and the skill and ingenuity of the radium therapist are almost monopolized by the treatment of cancer. As radium becomes more available and more widely used, the treatment of various benign conditions should receive proper attention and be perfected to the present standards of cancer therapy.

There are serious dangers attending the use of radium for benign conditions, and, as from overdoses of other useful drugs or physical agents, fatalities may result. The dosage for each disease cannot be standardized, each individual case demanding careful study; the factors of dosage must be formulated by knowledge and experience. Fortunately, the fact that benign lesions are successfully treated by doses which are moderate when compared to the heavy doses required in treating cancer affords a liberal margin of safety.

Many types of benign disease and acute and chronic inflammatory processes are favorably influenced by radium therapy. Even if radium were not used at all in cancer therapy, the excellent results gained by careful treatment of benign menorrhagia, uterine fibroids, and hemangiomas alone would establish it as a valuable therapeutic agent.

Bibliography

1. Bowing, H. H., Fricke, R. E., and Desjardins, A. U.: Benign uterine hemorrhage: Its treatment with radium. Am. Jour. Roentgenol. and Radium Therap., 29:497-510, (April) 1933.
2. Desjardins, A. U.: The specific radiosensitiveness of lymphocytes—its significance in radiotherapy. California and West. Med., 33:775-781, (Nov.) 1930.
3. Hiller, R. I.: Death following coagulation of the cervix. Jour. Am. Med. Assn., 104:1323-1324, (April 13) 1935.
4. Medical news, general: Importations of radium. Jour. Am. Med. Assn., 103:1161, (Oct. 13) 1934.
5. Rankin, F. W., and Palmer, B. M.: Postoperative parotiditis: Treatment without and with radium. Am. Surg., 92:1007-1013, (Dec.) 1930.
6. Schmidt, W. H.: The treatment of cavernous angiomas covered with healthy skin. Am. Jour. Roentgenol. and Radium Therap., 19:271-277, (March) 1928.
7. Stacy, Leda J.: The treatment of uterine fibromyomas. Radiology, 22:212-218, (Feb.) 1934.
8. Strauss, A.: Radium treatment and cavernous hemangiomas and of epulis. Am. Jour. Roentgenol. and Radium Therap., 19:265-270, (March) 1928.

PYRETHRUM IN THE TREATMENT OF SCABIES*

S. E. SWEITZER, M.D., and J. W. TEDDER, M.D.

Minneapolis

THIS investigation was prompted because we thought there was a need for a clean, effective and economical treatment for scabies. The old treatments have the disadvantage of being malodorous and dirty, and frequently cause a subsequent dermatitis with all of its attendant inconveniences.

The ideal scabicide should kill the acari, destroy the eggs by penetrating the burrows, and not cause a dermatitis, and the added advantage of cleanliness, absence of unpleasant odor, and ease of administration would greatly enhance the value of the remedy. Pyrethrum was suggested to us as a possibility and we have experimented with it in the routine treatment of scabies. This we believe is the first clinical investigation in the United States in which an extract of pyrethrum flowers has been used as a scabicide. We have been unable to find any report of its previous use for this purpose in America.

During the past few years several French investigators[1,2,3,4,5,8] have used pyrethrum externally in the treatment of scabies, and internally in the treatment of intestinal worms. Our investigation was concerned only with the external use of the drug. Pyrethrum has long been known as an insecticide, and the powder has been largely used for killing fleas (pulex irritans) and bedbugs (cimex lectularius). During the last decade spraying solutions containing pyrethrum have been extensively used for killing the domestic fly (musca domestica).

A perusal of the French literature[1,2,3,4,5,8] indicates that pyrethrum quickly and readily kills the sarcoptic mite, and that it does not easily cause a dermatitis. This latter advantage, we believed, would justify its trial in a series of patients infected with scabies.

Pharmacology

Pyrethrum flowers having insecticidal value are obtained chiefly from Pyrethrum cinerariæfolium (Chrysanthemum cinerariæfolium) and other species of pyrethrum which are grown on a commercial scale in Japan and Dalmatia. The insecticidal properties of pyrethrum flowers are due to two active principles, known as Pyrethrin I and Pyrethrin II, which are present in a good grade of flowers to the extent of 0.9 per cent.

Chemically, these pyrethrins are esters of the ketone-alcohol pyrethrolone with two acids, chrysanthemum monocarboxylic acid and chrysanthemum dicarboxylic acid methyl ester. It is difficult to extract the active principles in a pure state and there seems to be no advantage in purifying them, for it is possible that the presence of oily, resinous, and waxy substances makes for a better preparation. The ointment consists of an absorbent fatty base in which is dissolved the extractive matter of pyrethrum flowers. It contains 0.75 per cent pyrethrins, hence, 100 gm. of the ointment used in this investigation represents 83 gm. of pyrethrum flowers.

---

*From the Department of Dermatology and Syphilology, University of Minnesota, H. E. Michelson, M.D., Director, and the service of S. E. Sweitzer, M.D., Minneapolis General Hospital. Material for this investigation (Pyrethrum Ointment, Upsher Smith) was furnished through the courtesy of the Upsher Smith Company, Minneapolis.

We believe that an ointment of this strength need not have exfoliative qualities for it apparently readily penetrates the burrows and kills the eggs without the dangers of exfoliation.

Procedure

In our routine treatment of over 600 cases of scabies we have given the patients a four ounce jar of pyrethrinated ointment and a mimeographed copy of the following instructions:

> It is essential that the treatment should be followed exactly as set forth to obtain relief. Omission, or shortening of the time given, of either of the parts of the treatment will accordingly delay relief.
>
> Remove all clothing, and change bed clothes. All should be laundered before further use.
>
> *First night*
>
> 1. Soak in a tub of hot water for twenty minutes.
> 2. Stand beside bath and soap yourself from head to toes, using any good soap, liquid preferred.
> 3. Re-enter bath, rinse off lather, and dry with a rough towel.
> 4. Apply ointment over entire body from neck to feet.
>
> *Second night*
>
> Apply ointment over entire body.
>
> *Third night*
>
> Repeat first night's bath and application of ointment.
>
> Report to clinic on next regular day.

In most cases it is necesary to continue the treatment for a period of from five to seven days, and in a few obstinate cases the use of the ointment was required for a longer time on resistant lesions.

Results

In 618 cases which were routinely treated with pyrethrum ointment, it was found necessary to repeat or continue the treatment into the second week on eighty-eight cases. In thirteen other patients Wilkinson's ointment was used after the first week, either because of complications (impetiginous lesions or staphylococcal infections), improper applications, or poor coöperation. In the remaining 517 cases the treatment was found to be perfectly satisfactory in from five to seven days. Inasmuch as the investigation was carried out in a free dispensary the coöperation of the patients was not always all that could be desired. Some of our unsatisfactory results could be attributed to this difficulty. In the early part of this work we employed an ointment containing 0.5 per cent pyrethrins, but, as the observations continued, we found that by increasing the pyrethrum content of the ointment to 0.75 per cent pyrethrins fewer retreatments were necessary.

In only four cases did we encounter a suggestion of a sensitivity to pyrethrum. This diagnosis of contact dermatitis was confirmed by patch-testing with the ointment in only one case, the patch test being negative in the other three cases.

The *Journal of the American Medical Association*[6] quotes several articles concerning allergy to pyrethrum. One patient reported by Sulzberger and Weinberg[7] apparently showed a sensitivity to pyrethrum. Contrary to the general opinion that a large number of individuals are sensitive to pyrethrum, our investigation has not confirmed this belief. In all the cases that we have seen there is no evidence of toxic absorption from the ingredients in the ointment. Furthermore, a large local manufacturer of pyrethrum products informed us that he has not had a single case of dermatitis due to pyrethrum among his workers. In his grinding department, working forty hours a week, not less than four men handle the pyrethrum flowers constantly, and at least five other men are employed in that department in another capacity, where they come in close contact with pyrethrum. In his extracting department the process goes on continuously day and night, including Sundays, throughout the year, and employs eighteen men. Although these men come in close contact with the pyrethrum powder in charging the extractors, and also with the liquid extract of pyrethrum, no case of dermatitis has been encountered.

Conclusions

We have found pyrethrum ointment to be a valuable addition to the therapy of scabies. It is especially advantageous for use in private practice because of its cleanliness, pleasant odor, and freedom from irritation.

After the use of Wilkinson's ointment or sulfur ointment for scabies it is frequently necessary to use some bland ointment for several days following the treatment, in order to allay the sulfur dermatitis. In our series of 618 cases we encountered only four cases of dermatitis, which immediately disappeared on discontinuing the therapy. In our occasional cases of severe generalized pustular scabies we found it necessary to hospitalize the patient and use Wilkinson's ointment, and, therefore, this type of case was not treated in our series.

In conclusion, we feel that our results corroborated the findings of the French investigators in this field. Pyrethrum ointment offers an effective, pleasant, economical agent for the treatment of patients with scabies and can be used without discomfort or loss of time from work.

Bibliography

1. Chevalier, J.: Le pyrethre (chrysantheme insecticide). Activite pharmacodynamique et therapeutique. Bull. d. sc. Pharmacol., 37:154, (March) 1930.
2. Chevalier, J.: Le pyrethre. Ses preparations industrielles et pharmaceutiques. Evaluation de leur activite. Bull. d. sc. Pharmacol., 37:422, (July) 1930.
3. Chevalier, J.: Recherches pharmacologiques et therapeutiques sur les pyrethrines. Bull. Soc. de therap., 37:6, (Jan. 13) 1932.
4. Lemaire, A., et Gaudin, O.: Pyrethrins in the treatment of scabies. Bull. Sci. Pharmacol., 38:692-694, 1931.
5. Perrot, E. M.: Insecticides et vermicides; le pyrethre et ses applications. Bull. d. sc. Pharmacol., 39:42, (Jan.) 1932.
6. Queries and Minor Notes: Allergy to pyrethrum. Jour. Am. Med. Assn., 101:729, (Aug. 26) 1933.
7. Sulzberger, Marion B., and Weinberg, C. Berenda: Dermatitis due to insect powder. Jour. Am. Med. Assn., 95:111, (July 12) 1930.
8. Urbain, A., et Gulliot, G.: Sur les pyrethrines. Leur emploi en medecine veterinaire. Rev. de path. Comp., 416:493, (May) 1931.

MEDICINE IN LITERATURE

> *"There is no other education in humanity to compare with the doctor's life."*
>
> Francis Brett Young.

Does medicine influence literature? Perhaps it will help to arrive at some sort of an answer to this if we examine the records and try to ascertain in what extent modern writers have arisen from a medical environment and then, possibly, a peep into their writings will tell us if the exposure to this atmosphere is reflected therein. It is a fascinating study and not a difficult one, for the material is ample and readily accessible. Of all the channels into which the minds of medical people have drifted and found anchorage, writing seems to have been the one in which they have revelled the most lavishly and achieved the greatest success. There is so much of it in evidence that we shall have to be careful to stay within safe limits because of the risk of wandering too far afield in this rich expanse.

A medical environment is created in several ways. A person may begin the study of medicine and stop before he has finished. Michael Arlen did this. Born in Bulgaria of Armenian parents he was sent to an English school and later studied medicine for three months in the University of Edinburgh. This appears to have been the extent of his medical venture, for he started writing in 1913 at the age of eighteen, struggling laboriously until 1924, when the publication and dramatization of *The Green Hat* made him famous and financially comfortable. He writes in the free, untrammelled style of the modernistic school, without evidence of any especial influence of his Scottish training in medicine. A. S. M. Hutchinson, best known for *If Winter Comes,* went somewhat farther but stopped equally abruptly. Born in India of English parents, he was sent to London to study medicine. Two years at St. Thomas's Hospital thoroughly disgusted him; he gave it up without a qualm and turned his full attention to the writing for which he had much the greater urge. Gertrude Stein studied psychology under William James and was a student in Johns Hopkins Medical School, specializing in the anatomy of the brain. This is as far as she went in medicine and whether or not there was any resultant effect on her very individualistic style of writing is very problematical. Indeed it is very questionable if in any of the three instances mentioned their more or less casual contact with medicine has affected their writings. They are mentioned in this connection only as a matter of general interest, that at least their footsteps touched the threshold of the third oldest profession in the world's history before they took up the art of writing.

Another type of medical environment is found in the case of the children of physicians. Born in these circumstances were Owen Wister, Ernest Hemingway, Jacinto Benavente, Karel Capek, Dale Collins, Sheila Kaye-Smith, Sinclair Lewis, Emil Ludwig, Julia Peterkin and Henrietta Richardson. Here the trail grows stronger; in the work of all of these writers can be found the impress of the childhood days. Owen Wister's clear insight into human nature and his skill in character delineation are well shown in his *Seven Ages of Washington,* in his little *Philosophy Four* and in *The Pentecost of Calamity.* His father was a physician in Philadelphia of a past generation, Wister being now 75. Hemingway used to ride around with his father, a general practitioner in Oak Park, Illinois, later in Michigan, and he brings many of his observations acquired in that way into his shorter writings. Jacinto Benavente's father was a well-known pediatrician in Madrid and the son became one of the greatest living dramatists in Spain. The influence of his father's life and work may be seen in the fact of the writer's great fondness for children, culminating in his organizing a children's theater a few years ago. Capek is a Bohemian whose father, a country physician, encouraged him to study natural science. That he acquired a medical flair is shown by his play *The Makropoulis Secret,* a serio-comedy dealing in a fantastic way with the possibility of prolonging human life, really in opposition to his own expressed idea that "a short life is better for mankind, for a long life would deprive man of his optimism." Dale Collins, writer of adventurous sea stories, was born in Sydney, Australia, the son of an Irish ship's doctor who died when the boy was two years old. Sheila Kaye-Smith's father was Edward Kaye-Smith, M.R.C.S., L.R.C.P., practicing in a small seaport town, St. Leonards-on-the-Sea, England. A prolific writer of novels, the one bearing the most evidence of her early environment is *The Village Doctor.* Sinclair Lewis comes of a family of doctors. His father practiced in Sauk Center, Minnesota, and his maternal grandfather was a physician. His brother is a surgeon and he has an uncle who is a physician. *Arrowsmith,* published in 1925, was written with the help of Paul de Kruif, who supplied many details of scientific technic, but the story and the construction were entirely due to Lewis. Emil Ludwig's father was an eminent ophthalmologist, Hermann Cohn, of Breslau, who gave his son the name of Emil Ludwig at birth "because he wished to spare him the difficulty of bearing a Jewish name in a country where feeling against the Jews runs high," a precaution which, by the way, was wholly wasted, since the son always delighted in publicizing his Semitic origin. Ludwig's chief importance as a writer of biography is characterized by a keen sense of character analysis, as in the case of Owen Wister, and therein may be conceded the value of his early training in an atmosphere of scientific medicine. It seems fair to assume that of all who have been named in this list, Ludwig shows the most direct effect of hereditary and environmental influence. Julia Peterkin's father was Dr. Julius Andrew Mood, practicing in Laurens County, South Carolina. She thoroughly understands the Negro mind and her stories, one of which gained her the Pulitzer Prize for 1928, are woven around character studies of that race. Henrietta Richardson was born in Melbourne, Australia, the eldest daughter of an English doctor named Lindesay Richardson. She has always written under the name of Henry Handel Richardson, feeling, as did the Brontë sisters when they first began writing, that they would receive more consideration with a masculine name. The Brontës were soon discovered and dropped their pen names, but Henry Handel Richardson, now the wife of a faculty member in London, continues as before. That she, too, received deep and lasting impressions from her early associations is shown by the plot which runs through her trilogy *(The Fortunes of Richard Mahony, The Way Home* and *Ultima Thule)* which concerns the life of an Irish doctor who goes to Australia and has a most hectic career associated with very accurately depicted mental deterioration.

We now come to the most interesting class of all: the professional writers who are also graduates in medicine. Here we find some very well known names: those of W. Somerset Maugham, Francis Brett Young, Warwick Deeping, A. J. Cronin and Havelock Ellis in the British group, Georges Duhamel, Léon Daudet and Louis-Ferdinand Céline among the French and William Carlos Williams and John Rathbone Oliver for the Americans. Maugham, most famous as a playwright but probably destined to be remembered best as a novelist, spent several years as a medical student in St. Thomas's Hospital in London and successfully passed the Conjoint Board for his M.R.C.S. and L.R.C.P. degrees but he never practised. "His days at St. Thomas's were responsible, however, for his first novel, *Liza of Lambeth* (1897). The hospital is on the edge of Lambeth, a slum district which many Londoners consider worse than the famous Limehouse section. To the young medical student the cases that came to his attention were more interesting pathologically and psychologically than medically. *Liza of Lambeth,* dealing with the life he witnessed in Lambeth, was a failure; it was still the Victorian era, and those who read the book were shocked, saying that its author had gone out of his way to libel slum conditions."* He is supposed to have reproduced the first thirty years of his own life, including his entire medical experience, in the story of Philip Carey, the principal character in *Of Human Bondage,* except for certain non-essential details, possibly introduced for camouflage. Unlike Warwick Deeping, he did not use his medical training in his war service but was commissioned in the Intelligence Corps.

Francis Brett Young is the son of an English physician and himself studied medicine rather reluctantly at the University of Birmingham, for he felt himself much better fitted for a literary career than to try to follow in his father's professional footsteps. He began practice, however, in a small town in Devonshire, but continued to write and with some difficulty secured the publication of some of his efforts. Things dragged along this way until the outbreak of the World War. He was commissioned in the R.A.M.C. and was attached to an East African contingent. Invalided home, he was unable to resume practice or even to endure the English climate. He is a versatile writer and the quotation at the head of this article indicates quite conclusively that he has entirely overcome his early aversion to the study of medicine as an adjunct to his literary life. *The Young Physician,* written by him and published in 1919, is still further evidence.

Warwick Deeping took his M.A. and M.B. degrees in 1902, studied in Middlesex Hospital and began practice while still continuing the writing which he had begun in his student days. His father and grandfather had been doctors before him and he himself appears to have had no dislike for the work, but the success which attended his early literary efforts caused him to give up the profession of medicine at the end of a year and devote his entire time to writing. When the war came along he secured a commission in the R.A.M.C. and saw active service in the Gallipoli campaign and in France. His literary work since the war has been of a much better quality than before and he admits freely a much larger outlook on life and a better insight into human qualities. His *Sorrell and Son* is a very human document but his *Roper's Row* has a much more distinctively medical flavor and bears some evidence of being, at least in part, autobiographical. His *Seven Men Came Back* is the post-war story of the life and fortunes of seven men who had served together in France, one of them the company medical officer, a most lovable character but unfortunately, to us, dubbed with the cognomen of "Doc."

Cronin is too recent an addition to the ranks to say much about. He was a busy general practitioner in Scotland when his *Hatter's Castle* came out and it was so quickly accepted by the public that he decided to abandon his profession as a doctor and substitute that of writing. Since then he has produced three or four more novels and a few short stories. His writing shows clearly the influence of his medical training and experience.

Havelock Ellis is in quite a different class from any of the foregoing, for all his writings for many years past have dealt with quasi-medical subjects. Born in 1859, the earlier years of his adult life were spent along very conventional lines, with full absorption of all the ideas of the mid- and later Victorian period, plus the influence of an heritage of trends from an ancestry of clergymen. Then he began to do some independent thinking, especially in the way of psychological analysis, and in order to establish himself with a sufficiently broad foundation in biology he prepared himself with a complete undergraduate medical education simply for the one purpose. He is today the foremost exponent of the scientific fundamentals of abnormal psychology as interpreted from a biological standpoint and, of course, it is superfluous to say that his medical knowledge was of paramount importance in shaping these ideas.

Georges Duhamel, Léon Daudet and Louis-Ferdinand Céline are modern French writers with medical degrees. Duhamel is said to be still in active practice although a fairly prolific writer. Louis-Ferdinand Céline is the pen name of a doctor named Destouches who is a hard-working practitioner in a suburb of Paris and is a quiet, retiring type who much dislikes publicity. His one production thus far: his *Journey to the End of the Night* is a massive thing, evidently the result of many a long period of labor in the difficult circumstances under which it must have been written. In form it resembles very closely a very prolonged example of what our psychiatric friends would call a "flight of ideas." Duhamel saw active service in the war and many of his shorter writings resemble excerpts, suitably elaborated, from an army surgeon's notebook. Daudet, of course, should inherit literary tendencies from his famous ancestor; in medicine he is known as a competent neurologist.

Neither of the American representatives chosen for this little study has abandoned his profession entirely

(Continued on Page 811)

---

*Living Authors, by an anonymous writer. New York: The H. W. Wilson Company, 1932. The writer of the present sketch acknowledges some biographical references from this useful book.

EDITORIAL

MINNESOTA MEDICINE

Official Journal of the Minnesota State Medical Association

Published by the Association under the direction of its Editing and Publishing Committee

EDITING AND PUBLISHING COMMITTEE

J. T. Christison, Saint Paul
C. B. Wright, Minneapolis
E. M. Hammes, Saint Paul
T. A. Peppard, Minneapolis
Waltman Walters, Rochester

EDITORIAL STAFF

Carl B. Drake, Saint Paul, Editor
W. F. Braasch, Rochester, Assistant Editor
C. A. McKinlay, Minneapolis, Assistant Editor

Annual Subscription—$3.00. Single Copies—$0.40
Foreign Subscriptions—$3.50.

The right is reserved to reject material submitted for editorial or advertising columns. The Editing and Publishing Committee does not hold itself responsible for views expressed either in editorials or other articles when signed by the author.

Classified advertising—five cents a word; minimum charge, $1.00. Remittance should accompany order.

Display advertising rates on request.

Address all communications to Minnesota Medicine, 2642 University Avenue, Saint Paul, or 324 Fourth Avenue South, Minneapolis. Telephones: Nestor 1381 and Dupont 1013.

BUSINESS MANAGER
J. R. Bruce, Saint Paul

Volume 18 DECEMBER, 1935 Number 12

Socialization of Medicine

The subject of State Medicine is receiving much attention at present. The main reason why the subject deserves serious consideration is the fact that it has been established in several foreign countries and there is good reason to suppose that our country may follow suit. On the other hand the experiences of foreign countries afford good examples of how State Medicine, which is a socialistic affair, works in practice. Study of foreign experience shows conclusively that as a result of State Medicine morbidity and mortality from disease are not decreased, preventive medicine is not furthered, loss of time due to sickness has been increased, and the physician's time is much taken up with trivial complaints and routine paper work. While it has been stated that the average physician does not suffer financially, the spur to scientific improvement is lost to the physician just as personal initiative is so likely to be lost in governmental employment. It is the quality of medical service as now furnished in private practice that will suffer.

If it is advisable to socialize medical practice, why not socialize the other professions and the butcher, the baker, the candlestick maker? When we realize that even now the average American family spends more for automobiles, tobacco, cosmetics, radios and musical instruments than for doctors' fees, arguments for singling out medical care lose their force. Socialism has never been and is not now popular in the United States and neither is the socialization of medicine. There is much evidence that the average American citizen is most particular in having the physician of his choice. As a rule a patient will consent to patronize a free city hospital only from dire necessity.

The agitation for State Medicine does not come from the rank and file of the American public as typified by the labor unions or white collar workers, but from organized groups with State Medicine as their objective. In this connection it was interesting to read of the reactions of Mr. Edward A. Filene, one of the organizers of the Twentieth Century Fund and one keen for the socialization of medicine, who recently contracted pneumonia while on a visit to Russia. All the facilities of the Kremlin were put at his disposal, but the gentleman was not satisfied with socialized Russian medicine and insisted on wiring Professor Fritz Meyer of Berlin to come to his aid by aeroplane. Theoretically socialized medicine suited him, but it seems the irony of fate that in the practical test socialized medicine was lacking as far as he personally was concerned.

The high schools in Minnesota and elsewhere are debating the resolution that the states provide complete medical service. It is said that there is difficulty in getting debaters for the affirmative, which if true is significant.

What is to be done about the present agitation for State Medicine? The profession should be unanimously opposed to the proposition. The American Medical Association officers have been very active in disseminating information on the subject. Millions of pamphlets have been printed and distributed, syndicated newspaper articles and the radio have been utilized and three debate handbooks have been prepared for high school debates. The state journals are full of information on the subject.

Articles may or may not be read. For that reason the spoken word is often of more value. We often speak of the American Medical Association in the third person and forget that the county medical society members are the American Medical Association and express their wishes through their delegates at whose direction the officers act. What a medium for opposition to State Medicine lies in the 100,000 members of our county societies! There is a potential duplication of this strength in the Woman's Auxiliary membership. A grateful patient should be an easy convert. Someone recently rather facetiously remarked that the obstetricians occupied a strategic position.

Members should read the material on medical economics appearing in medical journals and do their part.

Bone Marrow Biopsy

The appreciation that hematology is actually a study of the peripheral manifestations of the blood-forming mechanism has led to an investigation of the bone marrow. Although biopsy of the bone marrow has been performed occasionally, only recently has simplified technic of trephining the sternum made the direct examination of the bone marrow a practical procedure in diagnosing obscure blood diseases.

Dameshek* has recently reported his experience in some 125 clinical cases. Under local anesthesia, incision is made over the sternum and with a small hand trephine a bone plug is removed and smears made of the marrow. Smears stained with Wright's or Giemsa's stain preferably are submitted to differential counts. Needless to say, it requires a hematologist of considerable experience to differentiate the cells.

Study of bone marrow smears in perfectly normal individuals was not made in Dameshek's series. The nearest approach to normal smears was made in autopsy material obtained soon after death. This enabled some estimation of the normal picture and the normal relation of early red and white cells.

Although the procedure was used at first in cases of blood disturbance in which the diagnosis was not in doubt, now it is used only in doubtful cases. In some twenty-six such cases it has resulted in twenty accurate diagnoses not possible through usual clinical methods. It failed in establishing the diagnosis in the six remaining cases.

Some of the observations of the author are worthy of note. The marrow was found hyperplastic in cases of myelogenous leukemia, both when the white blood cell count was increased and when it was normal or diminished. His experience warranted the conclusion that in the majority of cases of leukemia there is a normal or low white cell count. Cases of leukemia not possible of diagnosis from the blood picture alone were identified.

In the case of pernicious anemia he found that while the bone marrow was hyperplastic and contained large numbers of embryonic red cells, the percentage of normal nucleated red cells was diminished. After liver therapy the normoblasts predominated and the megaloblasts were rare. In this disease, something interferes with the normal maturing of the early red cells.

Perhaps the most interesting observation was in cases of Hodgkin's disease. Here there was an increase in the leukopoietic elements in a hyperplastic bone marrow with a marked increase in the immature leukocytes. This seems to confirm his belief that the disease belongs in the group of diseases of the blood-forming organs.

Most of the cases of Banti's disease seen by the author have been misdiagnosed and have proved to be aleukemic leukemia. In one case examined, which was clinically Banti's disease, there was an increase in the white blood cell-forming elements of the bone marrow, but the diagnosis still remained in doubt.

This author's study of the bone marrow confirms the conception that in both myelogenous and lymphatic leukemia the overgrowth of primitive, more or less rapidly growing cells which invade the blood-forming tissue chokes the red, white and platelet formation in the marrow.

Apparently a valuable addition has been made in the diagnostic field of obscure blood diseases.

---

*Dameshek, W.: Biopsy of the sternal bone marrow. Am. Jour. Med. Sci., 190:617, (Nov.) 1935.

Council on Pharmacy and Chemistry

Prior to the establishment of the Council on Pharmacy and Chemistry of the American Medical Association, in 1905, there was no way for American physicians to ascertain the value of new therapeutic remedies aside from their use clinically. While clinical experience in the use of remedies is a valuable test, this must be supplemented by accurate knowledge of the chemical composition of any preparation.

Before 1905, medical journals had no way of verifying the claims of advertisers and it is not surprising that even the *American Medical Association Journal* accepted advertising which in the light of present knowledge and ethics is not considered acceptable by American medical journals.

Foreign countries, even England, have been very backward in this matter of reliable medical advertising. It is surprising to find in some of the best British journals, advertisements which would not be carried in our journals. Recently several inquiries have been received by the Council from foreign medical journals, indicating that they are commencing to see the light.

Today all the state medical journals, except the *Illinois State Medical Journal,* restrict their advertising of therapeutic remedies to those approved by the Council. Physicians throughout the country may, therefore, place their confidence in the advertising columns of the state journals —Illinois excepted.

Few physicians appreciate the enormous amount of investigation carried on by the Council. Made up of chemists, pharmacologists and professors of medicine, who serve without compensation, and assisted by numerous consultants, the central office in Chicago investigates hundreds of remedies yearly, qualitatively and quantitatively, and relative to therapeutic applicability. Recently infections were reported following the use of a remedy nationally used. Through the investigation of the Council, which showed serious contamination of the product, the manufacturer was only too willing to take his product off the market. Such a check on the manufacturers tends to prevent laxity on their part.

A few years ago it was thought desirable for the American Medical Association to establish a Committee on Foods in an effort to bring some order out of the chaos which existed in the selling and advertising of foods. The absurd claims made by food sellers as to the health producing qualities of their wares made this step seem advisable. The way food merchants rushed to obtain the approval of the official committee of the physicians of the country has been rather complimentary to the profession. The desire for the approval of the Committee on Foods acts as a brake on extravagant claims for health producing qualities of advertised foods and assures the purchaser of the purity of the product.

The Council has its troubles. When a man's pocketbook is threatened he will sometimes go to most absurd lengths. The case of Ambruster is an example. In an effort to have all but Spanish ergot, in which he was financially interested, declared unfit for medical use, he has for several years been accusing the Council and even the United States Department of Agriculture of conspiracy to approve substandard drugs. That he was able to go so far as to gain the sympathy and support of at least one physician and one United States Senator and to carry the matter as far as a Senate committee investigation must have made him a thorn in the flesh to the Council. Incidentally, as reported in the *American Medical Association Journal,* the medical profession need not hesitate to use ergot preparations approved by the Council.

The physicians of the United States have established the Council on Pharmacy and Chemistry for their own protection and ultimately in the interest of their patients. That a certain number of physicians ignore the Council's existence, directly or indirectly, must be due to ignorance.

Interferin

Interferin (manufactured by the Keefer Laboratories, Chicago), "the first Amercan-made abortive paste," is said to be ". . . an oil and fat-free base containing iodine and iodine compounds, several astringents and antiseptics." A report by the Bureau of Investigation on Abortifacient Pastes (*The Journal A. M. A.,* June 11, 1932, p. 2155) noted that a similar preparation, Provocol (sold in this country as Leunbach Paste), contained olive oil, cacao butter, potassium hydroxide, sodium hydroxide, iodine, potassium iodide, tincture of benzoin, tincture of myrrh, thymol and water; also, that Interruptin (another similar product) was a soft paste containing iodine, thymol, camphor and the "active principles" of crocus, rosemary, eucalyptus, myrrh, "etc." In a short period the use of abortifacient pastes by German physicians resulted in twenty-five deaths, two of which occurred a few minutes after the injection. Since Interferin contains iodine and other ingredients similar to those in Interruptin and Provocol, there would appear to be an equal danger in its use. The firm cites no bibliography in the Interferin folder. (J. A. M. A., Oct. 12, 1935, p. 1210.)

MEDICAL ECONOMICS

Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association

B. J. Branton, M. D.
J. A. Moga, M. D.

W. F. Braasch, M. D., Chairman

J. C. Michael, M. D.
A. N. Collins, M. D.

What Can I Do For My County And State Medical Society?

Suggestion Number Three

1. Inform yourself on the provisions made for public health work by the Social Security Act. (A very brief summary is printed this month in these columns. For the complete text of the Act write the State Office, 11 W. Summit Ave., St. Paul.)

2. Coöperation and guidance of the practicing physician is specifically asked for by health authorities for planning and putting into effect the provisions of this act.

3. Each county and district medical society should have an active, functioning public health or contact or executive committee (it makes vary little difference what name is applied). This committee should guide and actively assist in all public health work in the community. If such a group is functioning in every locality great public good may come out of New Deal expenditures for public health. If it is not functioning in every locality when the wheels begin to move, quality of the health service provided and medical standards too will suffer.

4. Inquire into the situation in your community.

5. Have you an active public health committee in your society? IF NOT, APPOINT ONE!

Be prepared in YOUR SOCIETY to guide local medical aspects of the New Deal program for Public Health.

What has your society done to meet the problems in medical care for the indigent which the withdrawal of direct Federal aid has brought to a head in many parts of the State?

Have you studied the situation in your county to find out whether a re-organization of method in handling the tremendous problem of the sick poor might help?

Has your Committee of Three been in constant contact with local officials to assist them in their task and, at the same time, secure proper recognition of the right of physicians to remuneration for their work?

These are important matters. Your own future is at stake—and the future of medicine in the United States. *Only the vigorous, intelligent and fair minded coöperation of the physician in the affairs of his own local community will save the private practice of medicine in America from dictation and disrepute.*

Getting Ready to Hunt Illness

Enumerators for the "Doorbell Health Survey" are going to school these days under the tutorship of Frederick Russell Clark, director in Minneapolis, and R. H. Ewerts, director in St. Paul, as this issue goes to press.

The course of study includes intensive drilling on the complicated questionnaire and forms that must be filled out from door to door; also the proper approach to the householder to get him to tell all about his family's illnesses.

Training for the enumerators who are to work in Willmar, Winona and a range town, possibly Chisholm, is being carried on by representatives of Mr. K. E. Setre, state supervisor, representing the United States Public Health Service in charge of the Survey.

All From Relief Rolls

All of the enumerators have come from the relief rolls because this health survey is made possible by a special grant of WPA funds and its economic objective, at least, is the employment of a special class of "white collar workers" who are otherwise difficult to fit into the WPA picture.

The United States Public Health Service is, at the same time, making a serious effort to get reliable statistics on the amount of disease in the districts and states selected and its relation to medical services, according to Dr. A. W. Hedrich of Johns Hopkins, who is director for this Great Lakes region and who was quoted in these columns last month.

Householder's Permission May be Asked

Details as to the exact form medical coöperation with the survey is to take are still somewhat unsettled. As the plan now stands doctors will be asked to verify the statements secured at the door as regards diagnosis of disease and will be paid the customary fee of 25 cents each for such verifications.

The householder or housewife will be asked by the enumerator for her permission to check the matter with her physician. If permission is granted the word "confirmed" or "not confirmed" as the case may be will be noted on the questionnaire.

The enumerator himself will take a pledge to keep in confidence all information received before he starts his task.

All information will be edited and filed in Detroit and Washington and arrangements will doubtless be made, according to Dr. Hedrich, to separate the name of the individual enumerated from the statistics obtained.

"Impatient Facts"

Apropos of the Survey, here is a paragraph from the opening editorial from the November *Survey Graphic.* The editorial is entitled "People Like Ourselves," Forecast for *Survey Graphic,* by Paul Kellogg.

"For nearly ten years," says Mr. Kellogg, "*Survey Graphic* has followed as probably no other general magazine, one field of sharp controversy in which the consumer's stake is urgent —our need and use of medical services. Each year more experiments in both group practice and group payment go forward with the backing of progressive physicians and laymen. The five-year study of the Committee on Costs of Medical Care is now followed by the vast national inventory of chronic illness and disability which has been entered upon by the United States Public Health Service with benefit of WPA funds. It will add to THE IMPATIENT BODY OF FACTS on which we can, if we will, base sound efforts to break down the wall of cost between doctor and patient. As things stand, of the hazards originally blocked out by the President's Committee on Economic Security, sickness remains for report and action."

Representing the Social Worker

Mr. Kellogg well represents the attitude of the typical social service worker and of the philanthropic foundations which back the *Survey Graphic.*

They may be counted upon to invest any body of facts collected in the "Doorbell Survey" with an urgency and a color to match their own ambitions.

Really "progressive physicians and laymen," however, are assembling a stubbornly resistant body of facts which call for quite different conclusions and courses of action and supplementing it with experiments of a different character. It is obvious that such study and experiment on the part of the organized medical profession was never so important as now.

New Prospects For Public Health in Minnesota

What can Minnesota hope to get out of the public health appropriations that will be available —provided Congress appropriates the money— under the terms of the President's Social Security Act?

Representatives of the United States Public Health Service, the Children's Bureau, the American Medical Association, the State Board of Health, the Council of the Minnesota State Medical Association held an important conference to discuss that question Sunday, November 24, in St. Paul.

The question assumes an especial importance on the eve of the special session of the Legislature called specifically to determine Minnesota's participation in the new social security program.

Provided by the Social Security Act

Briefly, the Act as passed by the 1935 Congress authorized appropriation of a fund of some $8,000,000 to be distributed mainly on a matching dollar for dollar basis to the states for the extension of public health work under the central supervision of the United States Public Health Service; also a fund amounting to a total of $8,150,000 for extension of maternal and child welfare services, of services for crippled children and of child welfare services. This latter fund is to be centrally administered by the Children's Bureau under the supervision of the Secretary of Labor and part of this money also is to be "matched money."

Both are designed to reach the rural district, with public health services.

Minnesota's Share

If Congress, at its next session, appropriates the money authorized under this act, then Minnesota will be entitled, as things stand now, to an additional appropriation of approximately $93,000 for public health projects. This estimate is derived by matching existing appropriations for public health (a part of the federal moneys may be matched that way) and adding thereto the portion of the Equalization fund to which Minnesota, on a basis of population, is entitled, also a small sum for special health needs (matched money) and the flat sum allowed each state to aid in training personnel to carry out the new health projects.

A considerably larger sum might be secured for the state if the Legislature should appropriate any new funds this year. This latter part of the appropriation is available up to $47,865 only if it is matched by new state appropriations made since Jan. 1, 1935.

For Maternal Care

In addition to the above appropriations a special sum can be made available for maternal and child welfare, for crippled children and for child welfare to be administered under separate auspices and with authorization of the Children's Bureau and the Secretary of Labor in Washington. This appropriation will amount to $57,946 in Minnesota. Of this amount, $22,000 must be matched by existing appropriations for this purpose and officials estimate that Minnesota will be eligible to utilize the full amount, using appropriations made for public health nursing in the state for the necessary matching funds.

Doctors are Interested

As the principal agents in the extension of health and preventive medicine, doctors are interested in this program.

Special points of immediate concern are:

1. The $93,000 (approximate) that is to be made available under authorization of the United States Public Health Service can be used ONLY in districts that are under supervision of a full time health officer with adequate stipulated assistance.

Thus a powerful impetus is given from Washington for the organization in rural districts all over this country of the so-called "county health unit." Ideally this county health unit includes a full time health officer, two nurses, clerical help and a sanitary engineer. The number of counties thus organized in the entire country is comparatively very small and they occur in the East and South where the population is much denser than in the Middle West and where, as in Alabama, there are unique health problems.

Most of the Minnesota men agreed that the typical health unit would be impractical and unnecessary in rural Minnesota.

Minnesota Plans

It is the tentative plan of Dr. A. J. Chesley, State Health Officer, to organize, as a beginning, three district health units each of which is to include more than one county and each of which embraces different types of public health problems. These are to be in the nature of laboratory experiments in county or district health organization. The three full time health officers who will be in charge will probably be deputies of the state health officer and their jurisdictions sufficiently flexible to fulfill the letter of the requirements of the United States Public Health Service.

Requirements for Health Officers

2. To carry on the program for which the funds are to be appropriated a trained personnel is necessary. This personnel is not available at the present time and the representatives from Washington regard their training as the most urgent immediate need in laying the groundwork.

To qualify for the work of full time health officer a man must be not more than thirty-five years old. He must be a graduate of a Class A medical school. He must have at least a year of clinical training including preferably three months of training in pediatrics and three months in infectious diseases.

In addition these candidates must have special public health training. In the emergency, a course of three months is now prescribed with the understanding that these same trainees will later put in nine more months to receive a full year of work that carries with it a certificate in Public Health. Training centers for these candidates are inadequate according to the United States Public Health Service representatives. They will doubtless be increased as the program develops and there is a possibility that the University, with its unique teaching facilities in parasitology, biometry, bacteriology and with the State Board of Health as an integral part of the school, may offer itself and be accepted.

Maintenance payments are given to the trainees out of the special fund provided for the period of this special training.

Children's Bureau Funds

The $57,946 that may possibly be available through the Children's Bureau and the Secretary of Labor are to be spent as follows, according to the plan outlined at the meeting:

1. For education. This will take the form principally of "refresher courses" for physicians by which education in pediatrics and obstetrics will be brought to the local physician through the State Board of Health, the State Medical Association or the Children's Bureau.
2. For training of public health nurses.
3. For classes for parents and school children in nutrition, mental hygiene and dental hygiene.
4. For institutes in health education, laying out courses of training, etc.
5. For health conferences.
6. For pre-natal classes or clinics.
7. For a maternal delivery service—that is, for trained assistance that will be available at the call of the local physiciaan.
8. For a full time dentist, possibly, to be nominated by the state dental society to be used in the schools.

"We're Discharging a Well Recognized Obligation"—Dr. Miller

Said Dr. K. E. Miller of Washington, in charge for the United States Public Health Service of District No. 3 (of which Minnesota is part):

"We cannot reach the farms and villages from any central headquarters.

"It is only logical, therefore, to take Public Health to the people. It is, in fact, a responsibility of the state and federal government to see that adequate health facilities are provided for the people in the remote districts as well as in the cities. Title Six, section one, of the Social Security Act merely provides a means for the government to discharge this well recognized obligation.

"In any such program a central head is necessary, if only to protect the individual state agencies from the politicians and job seekers. Actually, however, the whole problem is in the hands of state and territorial health officers with the Public Health Service acting only as agent for these officers.

No Need to Rush

"One feature of these new appropriations should be noted especially. If there is a balance at the end of the first fiscal year it can be carried over and used another year. There is no need to rush into the field immediately with a full-grown local health service."

There is apparently no doubt in the mind of Dr. Miller as to the value and need everywhere of the local county or district health unit.

It was Dr. Miller's contention that wherever these full time health units have been established, they have never been abandoned because popular demand has made it impossible to abandon them.

He cited, especially, Alabama's county health units, all of which are identical so far as control is concerned with the county medical societies of Alabama.

"The county health officer in no way infringes upon the practice of the private practitioner. He is, in fact, the best possible advertiser of the services of the doctor. He persuades people of the value of preventive medicine when they are well, sends them to the doctor when they are sick."

"This is Not an Emergency Program"—Dr. McCown

Said Dr. Albert McCown, director of the Maternal and Child Health Division, United States Children's Bureau:

"The success of the Social Security Act will depend upon the understanding and coöperation of all.

"The program financed by the funds for maternal and child welfare and for crippled children will not be centrally dictated. We cannot, as Woodrow Wilson said, hear the voice of America in Washington.

"We must leave the real responsibility with the physicians in the local community.

"It will be the business of the state health department to decide just what agencies will administer the separate funds in each state, but these agencies must have the help of the medical, nursing and dental professions.

"Also they must have a well developed plan. This is not an emergency program and it is highly inadvisable to take any of this money until they are really ready to participate."

High Quality of Service Our Objective—Dr. Leland

Said Dr. R. G. Leland, Chicago, director of the Bureau of Medical Economics of the American Medical Association, speaking later before a meeting of the Council:

"These are the essential functions of a public health department:

1. To control communicable diseases
2. To collect vital statistics
3. To control the environment (as to sanitation, etc.)
4. To conduct public health education.

"As a profession, we believe in public health. We initiated the special public health department. We have always supported public health.

"Our objective, however, is not to spend money but to make sure of necessary services and to make sure, also, that these services are of a high quality.

We Must Assist

"The Social Security Act is not a matter for debate; it is a fact. We as a profession, believing as we do in public health, must assist in carrying out its aims to the limit of our ability. That assistance, following our objectives, should take the form of closer coöperation in the future between organized medicine and the administrators of public health.

"The passage of this act is a phase and sign of a great social change. It carries with it the hope of great benefit. It is our responsibility to see, if possible, that benefit is secured. We must lend a hand to all sane programs. We must confer freely and frankly with the state health agencies concerned. The delay in appropriations has given us a chance to think the thing through. We must help to make really constructive plans."

"Our Machinery Must be Ready to Function"—Dr. Bauer

Said Dr. W. W. Bauer, Chicago, director of the Bureau of Public Health and Instruction of the American Medical Association, speaking at the same council meeting:

"In the quack and faddist literature there is one significant note: it is that public health administrations are working hand and glove with the medical profession. Where that coöperation is closest the 'lunatic fringe' of medicine has the smallest chance to survive.

"Therein lies another suggestion to us that the health officer and the medical profession ought to be the closest of friends.

"Our objectives are the same. The patient of the physician and the client of the health official are one and the same person. In fact, it's all one problem of many phases and where there has been no health service the medical profession has been the first to demand such a service. When official inefficiency creeps in, the medical profession should be the first to demand a change.

"County medical society backing is the very best protection and backing for the public health department. Lacking that backing and protection, political influences creep in and the physician suffers.

"Every stimulus should be given to prompt the medical profession to help the health work in remote districts.

"Most of the work to be financed by these new appropriations will be done in your own local communities among your own people.

"The first step for us to take in guiding the new program is to urge, by every possible means, the formation of an active public health committee in every county.

"If we build that way we shall be ready to meet any emergency. Our machinery should be well oiled and ready to function."

Is the General Practitioner Delinquent?

The earnest desire of public health officials to secure the interest and coöperation of the medical profession was very evident at this meeting.

That this is a commendable spirit and that physicians, by the same token, should go more than half way to meet it goes without saying.

At the same time, physicians will not be persuaded, even in the interests of a very desirable coöperation, to sacrifice any vital principles of medical practice in so doing.

Nor are they wholly convinced of the urgent need for any elaborate new organization in Minnesota, for the improvement of public health.

Is the general practitioner, here, delinquent in the matter of the health education and protection of his patient? If so, would not the development of a system be desirable which would utilize the services of the practitioner and the county medical society rather than numerous full time health officers?

Elaborate Machinery

That the money authorized in the Social Security Act for the new program will not begin to cover its actual cost as it finally gets under way is obvious.

These appropriations merely lay the foundation for what may eventually become a very elaborate machinery composed of district, sub-district and local administrators; of clerks, nurses, dental staffs; of pharmacists and engineers.

For the present, however, organized medicine, vitally concerned in the improvement of public health, will welcome an intimately controlled cooperation with the Public Health Service.

Minnesota's Own Handbook For Debaters

The debate handbook prepared by the Minnesota State Medical Association is now on the press and should be ready to distribute to Minnesota debaters, debate coaches and interested members within a few days.

This handbook is unique among the pamphlets and publications that have been hastily assembled on all sides to assist in debating the 1935 high school question:

> **Resolved: that the several states should enact legislation providing for a system of complete medical service available to all citizens at public expense.**

For Easy Reading

It provides the only collection of excerpts and quotations from papers and speeches by men of note in Minnesota that is available anywhere for the debaters—together with other significant selections from personages of national fame.

Also these excerpts and quotations have been assembled with arresting titles and sub-titles and with plentiful use of variety in type and make-up so as to make the going as easy as possible for young students.

Every debate coach should have an opportunity to examine this special Minnesota handbook and distribute it to his debaters.

Available at State Headquarters

As noted before in these columns, the study material available to these students through the routine channels is incomplete and, for the most part, heavily loaded for the affirmative.

The state association, by means of this handbook and other material available at headquarters, 11 W. Summit Avenue, St. Paul, has done what it could to help balance the odds.

To Talk Matters Over

It is now the responsibility of each individual member in every community where high schools have entered the contest to see that coach and teams are supplied; also to see that the young debaters have an opportunity to talk matters over personally with at least one trusted, friendly physician.

It has been suggested that a Sunday night supper at the home of one of the physicians with the debaters as guests is a happy means of getting acquainted with the students and giving them whatever assistance they may require.

Auxiliary Will Help

In any such contact, as in many other ways depending upon the community, the Women's Auxiliary, whose Board recently agreed officially to help the physicians in any way possible, can be of great assistance.

Following is the list of schools that have filed with Mr. O. E. Smith, director of the High School League, to enter the competition.

Region Number I (5 Schools)

Elgin
Rochester
Spring Valley
Stewartville
Winona

Region Number II (9 Schools)

Fulda
Jackson
Luverne
Mankato
Pipestone
Round Lake
Wells
Windom
Worthington

Region Number III (8 Schools)

Canby
Clara City
Ivanhoe
Madison
New Ulm
Sleepy Eye
Winthrop
Wood Lake

Region Number IV (8 Schools)

Cambridge
Elk River
Mora
No. St. Paul
Randolph
So. St. Paul
Stillwater
White Bear Lake

Region Number V (16 Schools)

Albany
Atwater
Belgrade
Bloomington
Chaska
Cokato
Dassel
Deephaven
Excelsior
Holdingford
Litchfield
Mpls. North
Mpls. Roosevelt
Mpls. West
University H. S.
Willmar

Region Number VI (14 Schools)

Alberta
Alexandria
Barnesville
Cyrus
Fergus Falls
Frazee
Graceville
Glyndon
Moorhead
Moorhead T.C.H.S.
Pelican Rapids
Perham
Pine River
Wheaton

Region Number VII (20 Schools)

Aurora
Big Fork
Brook Park
Chisholm
Cloquet
Coleraine
Cromwell
Deer River
Duluth Central
Duluth Denfeld
Ely
Eveleth
Grand Rapids
Hinckley
International Falls
Proctor
Rush City
Sandstone
Virginia
Willow River

Region Number VIII (13 Schools)

Badger
Crookston
Hallock
Hendrum
Karlstad
Kennedy
Mahnomen
Oklee
Red Lake Falls
Roseau
Thief River Falls
Twin Valley
Warren
Total Number—93

Talks by Physicians

Dr. W. F. Braasch, Rochester, chairman of the Committee on Medical Economics of the association, addressed the students of the Rochester high school on the state medicine and the debate question Tuesday, November 19. It is to be hoped that arrangements will be made in all of the above communities for similar talks by local medical men. As suggested last month, a little time can undoubtedly be secured at the conclusion of the debates. Every society should be represented without fail at that time.

Requests for medical speakers on the subject to talk before luncheon clubs and other adult groups are frequent these days, also. For the assistance of such speakers who might otherwise refuse to take advantage of the opportunity for lack of time to prepare themselves, a complete talk has been prepared at the state office and is available to any member who asks for it. *This talk requires about thirty minutes to deliver in full, and may be cut to suit the time allotted. Members are urged to send for it and be ready whenever the occasion arises.*

Who is to Vaccinate—and Where?

Where and by what methods are the school children to be vaccinated against smallpox and immunized against diphtheria?

This question is a perennial source of discussion and difference of opinion among physicians, health workers and school authorities.

The answer most often given by the medical profession is that all such measures should be carried out in the doctor's office and, preferably, by the family doctor.

That this is the ideal solution admits of no question. At the same time, a mere statement of principle in this matter on the part of physicians will not, in most cases, bring in a sufficient number of children to provide adequate protection for the school or to satisfy either the physicians, themselves, or the school and health authorities.

Physicians Must Lead

The welfare of the children and, incidentally, the good repute of the profession, demands that physicians take a lead in seeing that the children in the schools, ALL OF THEM—have the benefit of these simple routine and universally accepted disease preventives.

If the physicians prefer to do the work in their offices—and most of them do—then they must see that every arrangement is made and every possible effort exerted to see that all the children get to their offices.

This is a definite social and professional obligation. Routine vaccination and immunization of school children will be done by somebody—if not by the doctors of the community acting together, then by some other agency. When the doctors allow the school authorities or social welfare agencies to do the job for them, they provide heavy ammunition for the lay critics of medicine.

When they undertake to do the job themselves and then make only a hasty, half-hearted effort, they simply add to the chorus of complaint—and with some justification.

The medical profession is under fire today as never before. A multiplicity of surveys and inquiries into the extent of disease is being made today and also into the extent and adequacy of medical facilities and the fitness for the task of the general practitioner and the family physician to distribute the benefits of modern preventive medicine to all.

Failures to lead in the vaccination and immunization of school children will be seized upon and magnified without fail by proponents of Social Medicine.

Opportunity

The job of immunization and vaccination of school children belongs logically to the county medical society. It is the job of the medical society to decide upon the method and then, having decided, to carry that method through to the satisfaction of every agency concerned.

Here is an opportunity to show the practical value of organized medicine to the community. It is also an opportunity, in case of indifference or failure on the part of the physicians, to chalk up another charge, however unjustly, against our system of medical care.

It is worthy of note that the questionnaire to be filled out for the Chronic Disease Survey of the United States Public Health Service includes several pertinent questions about vaccination and immunization. If nothing has been done on a large scale in your community to immunize and vaccinate the children, that fact will not go unnoted by eager observers of the results.

For Orderly Progress

There is to be no haphazard experimentation with new methods of care for the indigent or for low income groups in Wisconsin.

Anticipating the acute problems that are sure to present themselves to physicians everywhere as a result of the withdrawal of direct federal relief and the insufficiency of WPA wages for payment of medical care, also the abortive and uncontrolled experiments in the distribution of care that are likely to result from the propaganda for sickness insurance, the Wisconsin State Medical Society is now fully armed and legally qualified to supervise, control and coördinate all such undertakings. Thus progress in Wisconsin will proceed from now on in "orderly fashion."

This was the keynote of an important paper read by Mr. George Crownhart, executive secretary of the Wisconsin society, at the recent conference of secretaries of the American Medical Association in Chicago.

The paper covered substantially the same ground as the report from its Committee on Medical Economics which was reviewed in these columns a month ago. It will be printed soon in the Bulletin of the American Medical Association and should be read there in full.

Groundwork Is Laid In Wisconsin

In the meantime, it is worthy of note once more that Wisconsin has laid the complete groundwork for the solution of all of its medical economic problems. And it is the first state to do so.

Beginning with an amendment to its charter which specifically empowers its county units to enter into contract with county authorities for care of the sick poor WITH THE APPROVAL OF THE STATE SOCIETY, it has cleared the way for medical care for the indigent by the contract plan wherever that seems necessary. At the same time, it has provided for assistance in supplying contracts and advice by the state society. It has also approved, for appropriate urban and semi-urban communities, plans for special credit arrangements in low income groups. These, also, will require the approval of the state society and the state society is empowered by its House of Delegates to employ investigators to assist in establishing such plans.

For Other Patients

For other classes of patients who do not fit into either of these groups but who sometimes find medical bills difficult to pay, the state society is ready to equip each member with cards to be hung in their offices and with special credit blanks, all of which are to make it very clear to the patient that his own doctor is ready and willing to serve him at fees which he can pay; that his doctor will gladly sit down and work out a plan with him whereby he can secure and pay for all necessary care without recourse to charity clinics or to the embarrassment of bills he cannot pay.

When organized medicine everywhere takes stock of the needs of all the people, makes a rational provision to meet those needs and presents it to the public in the orderly fashion of the Wisconsin society, demands for radical reform in the Legislature will fall on deaf ears.

Washington's Plan

Among a large number of experiments in the delivery of medical service now under way under county medical society management in the United States, none is more interesting or more promising than the District of Columbia plan.

Dr. Wallace M. Yater, chairman of the Committee on Coördination of Resources for Medical Care for the Medical Society of the District of Columbia, is largely responsible for this plan. In the work of organization he has had the assistance of Mr. Ross Garrett, Health Secretary of the Council of Social Agencies of Washington, D. C. Dr. Yater and Mr. Garrett both attended the Chicago conference of secretaries and, incidentally, they may be available within the next few months to explain their organization and objectives to county medical societies in this quarter.

One Central Bureau

The distinguishing mark of the Washington plan is that it coördinates all of the medical resources of the community.

Thus every patient who applies for medical care in Washington—except those for whom payment of medical and hospital bills is no problem at all—is sent to a single bureau and is there classified into one of three groups:

1. The indigent who can pay nothing for medical facilities or services.
2. The semi-indigent who can pay a little for hospital care but not for medical services.
3. Those who can pay reasonable fees for medical and hospital care on a deferred payment plan.

The central administration bureau which makes this initial classification is a group of skilled receptionists, record clerks, interviewers and adjustors. They have access to all sources of information about persons residing in the District of Columbia.

Indigent Get Permission Cards

Members of the first group (the indigent) are given a permit card to attend the outpatient department of any of the nine Community Chest hospitals. The Community Chest pays the hospitals 50 cents for each visit. It is understood that this charge does not pay for medical services. If hospitalization is required they are referred also to the Permit Bureau of the Board of Public Welfare, which gives permits for hospitalization in municipal and contract hospitals, only.

Semi-Indigent Helped By the Chest

Members of the second group (the semi-indigent) are dealt with by the Central Administration Bureau, who decide how much of the charge of $4.00 per day can be paid by the patient himself. The Community Chest pays the rest.

Members of the third group (who can pay reasonable fees on the deferred payment basis) are referred to the Medical Dental Service Bureau. To make use of the services of this bureau the patient must either have been sent by his physician or he must get authorization from his physician or, if he has no physician, he is given a list of reputable physicians from whom to choose to go for medical or dental services.

When the Patient Can Pay

Regular credit arrangements are made with the patient, a reasonable installment agreed upon without any charge to the patient.

From the payments made by the patient, the bureau deducts 10 per cent for expenses and to establish a sinking fund.

Easterners Are Studying It

Medical men all over the East, especially, are watching the progress of the Washington plan with interest.

A group of them from all the seaboard states and east to Pennsylvania met recently and memorialized the Board of Trustees of the American Medical Association on the subject.

The Easterners have asked for another special meeting of the House of Delegates of the American Medical Association to meet and discuss it and kindred questions in February of 1936.

No statement has come from the Board as to whether or not it will be possible to comply with this request.

The bureau was originally financed from the treasuries of the four professional societies who joined in the plan: the Medical Society of the District of Columbia, the District of Columbia Dental Society, the Medico-Chirurgical Society (Negro) and the Robert T. Freeman Dental Society (Negro).

To Be Self-Supporting

It is confidently predicted that the bureau will soon be self-supporting and that the funds will be reimbursed to the contributing societies.

The sinking fund will probably be used to settle accounts of patients who, through adversity, become unable to continue their payments.

Through Mr. Garrett, a substantial contribution was also secured from the Community Chest to defray the expense of the Central Administration Bureau, which investigates and routes all of the patients.

Better Than Sickness Insurance

Great satisfaction is expressed by representatives from Washington with the functioning of this comprehensive plan.

Says the *Medical Annals of the District of Columbia:*

> "Every one in the District of Columbia is getting adequate medical care. Physicians, however, are still rendering free service to the indigent and semi-indigent, a condition which, while not entirely just, is infinitely superior to sickness insurance."

Minnesota State Board of Medical Examiners

To The Members Of The Medical Profession:

Re: Szent Norager, alias Dr. James Edw. Petri, Alias Dr. E. Mendoza.

The State Board of Medical Examiners is attempting to ascertain the whereabouts of one Szent Norager, who has used the alias of Dr. James Edw. Petri and Dr. E. Mendoza. This man is of Danish descent, between thirty-five and forty years of age and speaks English rather brokenly. This man has represented himself in the City of Minneapolis as being an M.D. His whereabouts at the present time are unknown. Within the past year he has lived at the following addresses in Minneapolis: 1110 Ulysses Street N. E., 4008 37th Avenue South, and 3863 Minnehaha Avenue. He has been represented as a patent medicine salesman and a fortune teller. Any information concerning this individual will be very much appreciated by the Minnesota State Board of Medical Examiners.

Minneapolis Quack Given Ten Months In Work House By Judge Guilford

Re: State of Minn. vs. Hyman Ginsberg, alias Dr. Robert Clark, alias Dr. Hy Burgh.

Following a trial by jury in the Court of the Honorable Paul W. Guilford, Judge of the District Court of Hennepin County, Hy Burgh, who was indicted by the grand jury of Hennepin County on July 11, 1935, under the name of Hyman Ginsberg, alias Dr. Robert Clark, alias Dr. Hy Burgh, was convicted of practicing healing without a basic science certificate. The defendant, who is twenty-nine years of age, and a barber by trade, was immediately sentenced by Judge Guilford to a straight workhouse term of ten months. The sentence was imposed on October 30, 1935.

For some time the defendant has operated a barber shop at 125 Oak Grove, Minneapolis. On or about May 1, 1935, an eighteen year old Minneapolis girl went to the barber shop of the defendant for the purpose of having an abortion performed. At the trial this witness testified that the defendant made a vaginal examination; punctured her ear with a needle and obtained a specimen of blood allegedly for the purpose of determining the condition of her health. The witness also testified that the defendant furnished her with capsules for the treatment of her blood condition and gave her a hypodermic injection in the arm. The state showed that the sum of $46.00 was paid to the defendant in this case. No abortion was performed and since that time the witness has married and is about to be confined.

In the investigation conducted by the State Board of Medical Examiners in coöperation with the Woman's Bureau of the Minneapolis Police Department and the County Attorney's Office, it was discovered that this defendant has repeatedly told patrons of his barber shop that he had studied medicine. Twenty prescriptions furnished by this defendant were found in a Nicollet Avenue drug store in Minneapolis. Thirteen of these prescriptions were in the handwriting of the defendant and seven were telephoned to the drug store. The name given in each case was "Dr. Bergman."

Upon being questioned by Judge Guilford, the defendant admitted that his true name was Hyman Ginsberg; that he had changed his name to Hy Burgh. The defendant also admitted that in March, 1932, he pleaded guilty to the crime of abortion in the District Court of Hennepin County. The investigation in this case discloses that this defendant has exhibited nothing but contempt for the medical laws of this state, but it is possible that the imposition of the longest straight jail sentence ever imposed in Minnesota for violation of the basic science law will cause this defendant to revise some of his opinions in reference to the medical laws.

The State Board of Medical Examiners is very grateful for the coöperation that was shown in this case by Mrs. Blanche S. Jones, Lieutenant in charge of the Woman's Bureau of the Minneapolis Police Department, and Mrs. Carrie Bystrom, her assistant. The case was tried for the state by Mr. Howard T. Van Lear, assistant to Mr. Ed J. Goff, County Attorney of Hennepin County. The fact that the jury deliberated only thirty-five minutes before returning a verdict of guilty should be conclusive evidence of the splendid job performed by Mr. Van Lear. The Medical Board believes that the sentence imposed by Judge Guilford should go a long way toward eradicating quackery in Minneapolis. The defendant was not given an opportunity to pay a fine, nor was he placed on probation. The sentence by Judge Guilford means that he will serve ten months in the Minneapolis Work House. The sentence imposed should be impressive not only to this defendant, but to a number of other quacks now operating in the City of Minneapolis.

Quack Pleads Guilty After Ten Days In County Jail

Re: State of Minn. vs. Carl F. W. Von Hagen, alias "Dr." C. F. W. Hagen

Carl F. W. Von Hagen

After spending ten days in the Ramsey County jail, Carl F. W. Von Hagen, who represented himself to the public as Dr. Hagen, entered a plea of guilty to an information charging him with practicing healing without a basic science certificate, before the Honorable John W. Boerner, Judge of the District Court, at St. Paul.

Hagen, sixty-two years of age, was residing at the time of his arrest on November 2, 1935, at apartment 3, 159 W. Summit Ave. He had arrived in St. Paul about July 1, 1935, coming from California. In Hagen's apartment at the time of his arrest were found approximately 100 bottles of pills and medicine, several instruments such as a microscope, stethoscope, blood pressure apparatus and others of a similar nature. Upon being questioned he stated that he was a homeopathic physician from Munich, Germany. However, when questioned at length in the office of the county attorney, Hagen admitted that he had never graduated from any medical school, nor had he ever lawfully acquired the title of Doctor. A complaint was filed against him charging him with practicing healing without a basic science certificate, and upon being arraigned in the Municipal Court before Judge Finehout, he waived his hearing and had his bail set at $1,000, which was not furnished. Hagen was remanded to the county jail where he stayed until he entered a plea of guilty. Counsel for Hagen advised the Court that the wife and sister-in-law of the defendant owned a farm a short distance from Charles City, Iowa, and that the defendant desired an opportunity to do farming. Hagen was warned that he could not practice medicine nor healing in the State of Iowa without being lawfully authorized to do so, and he stated to the Court that he had no such intention. Judge Boerner imposed a sentence of one year in the St. Paul Workhouse which was suspended on condition that the defendant refrain from practicing healing in any manner in the future. The Court also ordered the medicine and equipment confiscated by the state. Hagen was placed in charge of the probation officer for Ramsey County.

The State Board of Medical Examiners received splendid coöperation from Mr. James F. Lynch, assistant to Mr. Mike F. Kinkead, County Attorney. Valuable assistance was also received from Mr. A. Johnson, detective assigned to the County Attorney's office. The picture of the defendant was furnished through the courtesy of Mr. John J. Tierney, Superintendent of the Bureau of Identification of the St. Paul Police Department. The State Board of Medical Examiners realizes that the good results obtained in these cases were possible only through the coöperation of these various agencies.

Itinerant Chiropractor Pleads Guilty To Fraudulent Advertising

Re: State of Minnesota vs. Wm. B. Covey, D.C.

Following an investigation conducted by the Minnesota State Board of Medical Examiners in coöperation with Mr. T. O. Streissguth and Mr. John Reitter, county attorney and sheriff respectively of Brown County, Wm. B. Covey, who is licensed to practice chiropractic in the State of Minnesota, was arrested at New Ulm, Minnesota, on November 6, 1935, on a charge of fraudulent advertising. The complaint was based upon the insertion of the following ad in the *New Ulm Review* on October 31, 1935:

> FREE CLINIC
> Wednesday, Nov. 6th
> Dakota Hotel—New Ulm, Minn.
>
> I will again conduct a FREE CLINIC in my office in the
>
> DAKOTA HOTEL
>
> I am using a highly developed scientific instrument, and with its aid it is unnecessary for me to ask you one single question as to your symptoms or have you remove any clothing.
>
> This instrument will locate all the diseased organs, glands and tissues, and will definitely locate poisons and infections causing such ailments and diseases that occur in our bodies. I urge you to take advantage of this opportunity, if you are ailing and have not been able to get results or relief, and feel that you have not located the cause of your ailment.
>
> This clinic is sponsored by Dr. Covey, D.C., representing Dr. Niblock's Clinic, Lincoln, Nebraska.
>
> Married women must be accompanied by their husbands, minors by parents.
>
> Hours 9:00 to 5:00

The advertisement is nothing but "bait." The real object of putting on the "free clinic" is to get the ailing to call upon Covey and then an attempt is made to sell them a so-called concentrated health food, a supply of which costs approximately $10.00 per month per patient. According to the defendant, this so-called food, which is used in the treatment of ailments is sold by "Dr. Niblock's Clinic & Food Laboratories, Lincoln, Nebraska." The "scientific instrument" referred to in the ad is what is known as a *pathoclast*. Covey stated that it was manufactured by the Pathometric Laboratories, Chicago, Ill., but admitted that he did not know how it operated, although it cost him $400.00, and that he was in such a "highly nervous condition" due to his arrest, that he was unable to demonstrate its diagnostic power in the office of the county attorney. Upon being taken before Otto J. Kolb, Justice of the Peace at New Ulm, Covey entered a plea of guilty and was sentenced to pay a fine of $75.00 plus $6.14 court costs, or to serve sixty days in the Brown County jail. Covey stated that he could not pay the fine and accordingly went to jail. A true indication of the quackery and fraud perpetrated in this case is found in the diagnosis given by Covey following an examination with this machine of a patient who called upon Covey at New Ulm. This patient at the present time is under the care of a New Ulm physician for pulmonary tuberculosis. According to Covey the machine indicated that the patient had kidney trouble. No statement whatever was made by the defendant to the patient about the condition of his lungs.

Covey admitted operating during the past six months in the following towns: Luverne, Pipestone, Worthington, Jackson, Windom, Blue Earth, New Ulm, Springfield, Granite Falls, Canby and Olivia. The Medical Board respectfully requests that it be notified if any advertisements appear in the future in reference to this defendant or this "scientific instrument."

The Medical Board wishes to acknowledge the splendid assistance given in this case by Mr. T. O. Streissguth, county attorney, and Mr. John Fordyce, his assistant. The Board also appreciates the prompt and efficient services of Sheriff Reitter and his deputy, Mr. F. F. Benzel.

This is the first time since the passage of the Basic Science Law that a prosecution has been instituted under the statute forbidding fraudulent advertising. This statute will be resorted to more frequently in the future unless this type of advertising is discontinued throughout the state.

THE CONNELL CANCER CURE

In Kingston, Ont., Dr. Hendry C. Connell, an assistant professor at Queen's University Faculty of Medicine, has announced a new treatment for cancer. It has been heralded by the press as a "cancer cure." Kingston has turned over part of its municipal hall for the enlargement of his research work and the Department of Health of the Ontario government is collecting cancer tissue from all parts of Canada so that Dr. Connell can use it in making up his preparation. He calls it "Ensol." The background of this performance is said to be some experiments made by Dr. Connell four years ago in an attempt to control cataract. He claims to have developed a substance which would break down cataractous lens tissue without reacting on other proteins. By a similar process, he says, he developed an enzyme which would break down cancer tissue. In a letter to *The Journal of the American Medical Association,* Dr. Connell stated that he had promised to submit a complete statement of his work to the Canadian Medical Association Journal and requested the American Medical Association to send a representative to witness his results. He also submitted a statement alleged to be an account of the method of preparation of his product and an account of his results, which include merely some regression of cancer tissue. The methods pursued by Dr. Connell in promotion of his product reveal procedures more like those of the charlatan than of the scientific investigator. Moreover, his statement of the method of preparation of his product is so incomplete and confused as to make duplication of his work impossible. The results he claims are similar to those which have been obtained with a half-dozen other methods. In a few cases there are apparently temporary remissions due to damage of the blood vessels in the tumor. Results just as good occur with the methods used by most of the cancer quacks. There does not appear to be any real evidence that an antitumor enzyme is present in the mixture. Notwithstanding these considerations, newspapers have heralded widely Dr. Connell's claims. Great numbers of sufferers from cancer have been stimulated to false hopes. Time is the true tester of cancer cures—yet newspapers continue to lead cancer sufferers to promoters of cancer cures that have been tested only a few weeks or months. If Dr. Connell really realized his responsibility he would have waited to inform the newspapers until he knew whether or not his "discovery" actually had merit. (J. A. M. A., October 5, 1935, p. 1122.)

OF GENERAL INTEREST

Dr. R. A. Curtis, formerly of Le Center, is now located in Osseo, Minnesota.

* * *

Dr. V. I. Miller of Mankato attended the Railway Surgeons meeting in Chicago, in November.

* * *

Dr. R. N. Andrews of Mankato attended the American Academy of Pediatrics meeting at St. Louis, last month.

* * *

Dr. J. B. Robertson recently moved from Cottonwood, Minnesota, to Minneapolis, and is now living at 4849 Oakland Avenue, South.

* * *

Dr. Fred J. Pratt of Minneapolis was a guest speaker before the Section on Otolaryngology of the Southern Medical Association in St. Louis, Missouri, November 21.

* * *

Dr. Walter Stillwell of the Mankato Clinic, who has been taking special work in Vienna, will return to Mankato about December 8. He reports having a very profitable sojourn.

* * *

Dr. E. M. Sorensen, member of the Bratrud Clinic, Thief River Falls, returned November 1 from Washington University, St. Louis, Missouri, where he completed a four weeks' postgraduate course in pediatrics.

* * *

At the regular monthly meeting of the Union Hospital Medical Staff, New Ulm, Minnesota, on November 13, Dr. Cornelia Saffert spoke on "Heat Stroke." Dr. E. K. Geer of Saint Paul addressed the members on the subject "Oleothorax."

* * *

Dr. Hugh Cabot of Rochester appeared before a special meeting of the St. Louis County Medical Society, November 25, and discussed certain phases of kidney tumors. In the evening he gave the principal address before the Council of Social Agencies, discussing future methods and principles for providing adequate medical service.

* * *

Dr. and Mrs. F. Moersch and Dr. and Mrs. J. L. Bollman of the Mayo Clinic, Rochester, were mobbed by Fascists in Padua when they were mistaken for Britons. Their car bore an English license plate and was damaged in the savage scuffle which lasted a half hour before the police could rescue the Americans. An American flag displayed on the car failed to prevent the disturbance and suffered indignities at the hands of the mob.

* * *

Doctors Elizabeth Bagley, Selma Mueller, and F. H. Magney gave vivid and instructive reports at the November staff meeting of St. Mary's Hospital, of what they saw and heard at the recent Detroit meeting of the International Assembly. Dr. Magney characterized these well known meetings as a superb review for the general practitioner and a chastening reminder to others that the universality of disease should not permit them to penetrate too isolatedly into the rarefied atmosphere of specialism.

* * *

The voluntary committee of Medical Alumni of the University of Minnesota, formed for the purpose of financing and selecting a suitable memorial to the late Dr. Perry H. Millard, first dean of the Medical School, has collected sufficient funds to carry out the project. At a recent meeting of the committee it was decided to erect in the near future a granite monument with appropriate inscription at Dr. Millard's grave in Stillwater. It is proposed that the monument be dedicated with appropriate ceremonies a few days prior to the meeting of the State Medical Association next spring.

* * *

Warning

A man going by the name of E. H. Flaherty has been soliciting, under false pretenses, cash payment subscriptions to the *American Heart Journal*, published by C. V. Mosby Company, St. Louis, Missouri. He is not an agent for this journal but seems to have a supply of receipt blanks bearing the name of the company and the journal and is making a special offer of a two-years' subscription for $14.00. The yearly rate for the journal is about to be changed from $7.50 to $8.50 and The American Heart Association is offering a year's membership and a year's subscription to the *Journal* for $10.00, which is correct, but Mr. Flaherty has no authority to make either offer—his own false offer, or that of the Association. He asks for cash payment—or payment by check—stating that the offer is open only to those who pay in advance to the agent. Several Minnesota physicians have been taken in by this crook.

Medicine in Literature

(Continued from Page 796)

for letters. William Carlos Williams is in active practice in Rutherford, New Jersey, but has found time to write a number of books since 1909. One of his later novels, *A Voyage to Pagany,* covers the life of a doctor who becomes tired of the atmsophere of a small town in this country and tries to remedy matters by a complete change. He goes to Europe and lives in the setting of an older civilization but without accomplishing anything.

John Rathbone Oliver is a brilliant example of a many sided mind. He is a musician, a student, a teacher, a psychiatrist, an ordained minister, a medico-legal expert with much experience in criminal matters, a medical historiographer and saw some service in the Austrian Army. There is much evidence of all of these activities in his writings.

What conclusion shall we draw from all this? Simply, I think, that the more opportunity a writer has had to acquire medical knowledge, the more apt he is to use it and the more accurate are his observations.

Gilbert Cottam

—From *Hennepin County Medical Bulletin,* 6:57, (June 25) 1935.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

Medical Broadcast for December

The Minnesota State Medical Association Morning Health Service

The Minnesota State Medical Association broadcasts weekly at 10:00 a. m. every Monday over Station WCCO, Minneapolis and St. Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month will be as follows:

December 2—Parents and Children.
December 9—Growth Disturbances.
December 16—Swallowing Difficulties.
December 23—Fighting Tuberculosis.
December 30—1935, Medically Speaking.

Duluth Surgical Society

The newly organized Duluth Surgical Society held its first meeting in October and plans to hold a monthly dinner meeting preceding the meetings of the St. Louis County Medical Society. Dr. T. O. Young is president and Dr. P. F. Rudie is secretary-treasurer.

Minnesota Society of Internal Medicine

At the semi-annual meeting of the Society of Internal Medicine, held in Saint Paul, November 11, Dr. F. J. Hirschboeck, Duluth, was elected president; Dr. George Eusterman, Rochester, vice president, and Dr. Max H. Hoffman, Saint Paul, secretary-treasurer. It was decided to hold the spring meeting at Duluth, instead of at Rochester, so as not to conflict with the State Medical Association meeting, which this year will be held at Rochester at about the same time.

Red River Valley Medical Society

The fall meeting of the Red River Valley Medical Society was held at the Hotel Warren, Warren, Minnesota, on the evening of October 29. The meeting was preceded by a dinner. The scientific program was as follows: "Rupture of the Spleen"—Dr. C. W. Burns, Winnipeg; "Fracture of the Shaft of the Humerus"—Dr. A. P. MacKinnon, Winnipeg; "Case Report of Lateral Sinus Thrombosis"—Doctors L. G. Culver and R. V. Sherman, Thief River Falls.

Renville County Society

Dr. A. J. Chesley, of the State Board of Health, talked on "Public Health Problems" at the annual meeting of the Renville County Medical Society, held at Fairfax, Minnesota, Tuesday, November 19.

The following officers were elected for the coming year: President, Dr. A. A. Passer, Olivia; vice president, Dr. R. C. Adams, Bird Island; secretary-treasurer, Dr. John Dordal, Sacred Heart; delegate, Dr. R. C. Adams, Bird Island; alternate, Dr. R. S. Madland, Fairfax.

Saint Paul Surgical Society

The first meeting of the recently formed Saint Paul Surgical Society was held in the Ramsey County Medical Society rooms, Thursday, November 14, 1935. The officers are Dr. Harry B. Zimmermann, president; Dr. E. Mendelssohn Jones, vice president; Dr. Logan Levin, secretary-treasurer. Dr. William T. Peyton and Dr. Owen H. Wangensteen have been made honorary members of the society, which numbers thirty-two active members. Monthly meetings will be held the second Thursday in each month.

WOMAN'S AUXILIARY

Mrs. F. J. Elias, *President,* Duluth, Minn.
Mrs. L. W. Barry, *Editor, Press and Publicity,*
2193 Sargent Ave., St. Paul, Minn.

The various county auxiliaries to the Woman's Auxiliary to the Minnesota State Medical Association have begun their work for the year and interesting reports are coming in concerning their activities.

Ramsey County.—The Auxiliary to the Ramsey County Medical Society, under the able leadership of Mrs. J. J. Ryan, held its first meeting in October at the home of Mrs. H. E. Binger. Between ninety and 100 members were present. At the business meeting, tentative plans to form a Study Club of interested members, for the purpose of studying medical problems of interest to the wives of doctors, were discussed and approved. It was voted to add the names of Mrs. Archibald MacLaren, Mrs. Arthur Sweeney, Mrs. P. H. Bennion and Mrs. John Fulton to that of Mrs. H. P. Ritchie, as honorary members of the society. Mrs. Ritchie is also an active member. In the absence of Mrs. F. J. Elias, president of the State Auxiliary, Mrs. E. M. Hammes, president-elect, gave an interesting message from the State Society. After the business meeting, a program of music given by Mrs. Adolph Ahrens and Mrs. Webb Raudenbush was enjoyed.

St. Louis County.—The Auxiliary to the St. Louis County Medical Society is a very active group and already have added considerably to their treasury by various ways. Mrs. R. S. Forbes of Duluth is directing the work this year. They have raffled off two dolls, completely outfitted with hand-made wardrobes, netting them about $20.00; a bridge party netted about $55.00, and at the last monthly meeting a Reno party brought in $15.00. They are also gathering canned goods, jams and jellies for the Christmas baskets which the Philanthropic Committee distribute to needy families at

Christmas time. They also plan to award a scholarship to a graduate nurse in the spring.

Mower County.—Mower County Auxiliary has held two regular meetings this fall at St. Olaf Hospital in Austin. Members spent the afternoons folding dressings for the hospital.

* * *

Mrs. F. J. Elias, president of the State Auxiliary, and Mrs. E. M. Hammes, president-elect, recently attended a Board meeting of the Woman's Auxiliary to the American Medical Association in Chicago.

* * *

From the American Medical Association comes the announcement of radio programs. Dr. W. W. Bauer outlines what the auxiliary can do to help the A. M. A. radio programs, as follows:

1. Listen to it, so you will know what it is.
2. If the local NBC station does not take it, ask them to do so.
3. Write letters to the National Broadcasting Company, if you like the program, and to the A. M. A. if you do not, stating *why*.
4. Tell your friends about it.
5. Tell organizations about it, especially those to whom it may be useful—Women's Clubs, Child Study Groups, Parent-Teachers' Associations, and *schools.*

* * *

"Your Health—Ladies and Gentlemen . . ."

This toast—through the music—each Tuesday, at 4:00 p. m., Central Standard Time, introduces the new radio program of the American Medical Association offered over the Blue network of the National Broadcasting Company. With the coöperation of the National Broadcasting Company, a new type of program, in vivid dramatic form with incidental music, has been developed, showing medical emergencies and how they are met. The hero of the medical emergency, the doctor who is available day and night for the protection and promotion of your health, is the real sponsor of this series of practical and entertaining health broadcasts.—North Central States Number *News Letter,* October, 1935.

PROCEEDINGS *of the* MINNESOTA ACADEMY OF MEDICINE

Meeting of October 9, 1935

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, October 9, 1935. The President, Dr. A. R. Hall, in the chair.

There were fifty-six members and one guest present.

Dr. J. M. Armstrong read the following Memorial to Dr. C. Naumann McCloud.

Dr. Charles Naumann McCloud, a member and former president of this Academy, died of tularemia, August 13, 1935. To have known him provides sufficient evidence that no eulogy of his life need be pronounced. First and foremost, he was a gentleman, a lovable companion, and a loyal friend. His family life was a particularly happy one and no trace of misconduct marred his career as a husband and father or in his relationship with his fellow men. As a general practitioner, he was a sympathetic advisor and able counselor. He had the respect of his confreres and was loved by all who knew him.

Dr. McCloud was born in St. Paul, February 9, 1872. He received his preliminary education in the Public Schools and at Macalester College, and obtained the degree of Doctor of Pharmacy from the University of Minnesota in 1895. In 1901 he was graduated from the Medical Department of the same institution. He was intern at the City and County Hospital the following year, and was Assistant City and County Physician in 1903.

In 1903 he became associated with the Minnesota Mutual Life Insurance Company, as Medical Referee, and was advanced from time to time until he became Medical Director, in 1908, and Vice-President of the Company in 1934. He retired from general practice in 1933 to devote his entire time to his insurance work.

Dr. McCloud was president of the Ramsey County Medical Society in 1920, and was a member of the State and American Medical Associations, the Association of Life Insurance Medical Directors, and the American Life Conventions, having served as chairman of the Medical Section of the latter organization. He was a member of the staffs of St. Luke's and the Charles T. Miller hospitals.

In addition to his professional associations, he was a member of the Masonic order, the Minnesota Club, the Theta Delta Chi and Nu Sigma Nu Fraternities, and of St. Clement's Episcopal Church; to all of which organizations he gave his devoted and generous support.

On October 18, 1904, Dr. McCloud was married, in St. Paul, to Agatha de Lambert, who survives him. One son, David M., a graduate of Harvard, is an attorney in Dallas, Texas; and the younger, Charles Naumann, Jr., a graduate of Princeton, is attending the University of Minnesota preparing to follow his father's profession.

The Committee:
J. M. Armstrong
F. E. Burch
H. W. Cook

The scientific program followed.

ACUTE ATROPHY OF BONE

Report of an Unusual Case Involving the Radius and Ulna

M. S. Henderson, M.D.
Section on Orthopedic Surgery
• The Mayo Clinic
Rochester

Abstract

Acute atrophy of bone is a definite clinical entity distinct from the chronic atrophy of bone that follows disuse, and is commonly seen in the extremities and in the spinal column. The lower extremity is affected more often than the upper, and atrophy is usually limited to the bones of the foot, although the lower end of the tibia and fibula may also be involved. There is frequently an initial injury, although atrophy may develop spontaneously. Such injury is usually slight, a simple twist, a blow, or a bump, and there ensues a latent period which varies in length and may last a few days to a few weeks, although when the spinal column or long bones are involved it may extend into months. The signs vary according to the site of the disease. In the upper extremity the condition is manifested usually in the bones of the hands and wrists, and is more often seen following a severe injury, such as a fracture, than is the case in the lower extremity. Edema, cyanosis, and atrophy of the skin are the common objective signs, and pain and soreness the subjective. Wasting of muscle is commonly seen. In the lower extremity the disease usually lasts over a period of months, but it may last several years and cause total disability in the extremity affected.

The radiological findings are more or less typical. There is no alteration in the form but a diminution in the density of the bone. The roentgenogram discloses a moth-eaten appearance of the bones involved during the acute stage but, as the condition becomes more chronic, this moth-eaten appearance disappears. The spongiosa become wide meshed and the lamellæ are thicker and stronger, but chiefly the longitudinal fibers. The prognosis is good although the disease may last from a few months to several years.

Treatment consists of heat, contrast baths, massage, and active and passive movements, the former being by far the most important. Use to the point of toleration of the affected limb is indicated. Supports and braces and casts are contraindicated, as are manipulations, particularly under anesthesia. Leriche of recent years has advocated ganglionectomy and has reported cases showing its usefulness, but it seems rather a heroic measure for a condition that responds so well to conservative measures.

In 1925 Noble and Hauser reported from the Mayo Clinic forty-eight cases covering the period from 1912 to 1924. I reviewed the Mayo Clinic files from 1930 to 1934 and found fifty-five additional cases. In eight of these acute atrophy of the bone occurred in the hand and in forty-seven in the foot and ankle. In eighteen of the forty-seven cases in which the foot and ankle were involved, there was a definite history of trauma. In those cases in which the onset was sudden and without trauma, the duration of the disease was longer and they did not respond so well to treatment.

The case reported was an unusual case of atrophy of the bone of the radius and ulna following a mild injury. The patient came to the Mayo Clinic two years after the onset and in that time there had been one exploration of the bone with negative findings. There had been a pathological fracture of the ulna in the upper third and of the radius in the upper third, both fractures coming on during some slight movement. The findings at the time of the examination in the clinic in October, 1925, disclosed pathological fractures in the bones with extreme atrophy and almost complete disappearance of the ulna in its entirety, the radius also showing atrophic changes. The patient was under observation for eight months and the atrophy continued. Several times three to four ounces of clear serous fluid was withdrawn with an aspirating needle. Guinea pig inoculation tests for tuberculosis were negative. Finally, the arm was operated upon, massive bone grafts being applied at one time to the ulna and later to the radius. The radius completely regenerated and the ulna partially in the lower two-thirds. Amputation had been advised, and the bone grafting operations undoubtedly saved the arm. The elbow at present is a poor elbow, being somewhat flail, but the hand is normal and the patient reports now, ten years after the operation, that he does practically everything and has no discomfort.

There is no adequate explanation as to the etiology. The probabilities are that the acute atrophy of the bone is due to a trophoneurosis partially explainable on the theory that reflex irritation and stimulation of the trophic nerves produces an increase in the metabolism of the tissues and that for some unknown reason the calcium is carried away from the bone.

Discussion

Dr. A. R. Colvin (St. Paul): In discussion of Dr. Henderson's paper, I should like to show some x-ray films of a case very similar to the one he reports. The films are of the radius of a young woman, 23 years of age, a nurse at the City Hospital. She attributed her trouble to having lifted a heavy sterilizer lid and was said to have had a green-stick fracture. This was about a year before I saw her in 1925. She complained then of severe and constant pain in her arm, though objectively there was nothing to be made out. The radiograph showed a mere washed-out shadow of the radius, the bone being about the normal size, however, and so presenting the appearance of eccentric atrophy. She complained so bitterly after a while that I reluctantly consented to explore the bone, hoping that this might afford some relief. The wound healed quickly but there was no relief of pain. The tissue removed showed some exceedingly fine trabeculæ and a rather loose fibrous tissue replacing the medullary tissue; not, however, being exactly like osteitis fibrosa. There was no excess of fatty tissue in the medullary cavity as is so often seen in the acute atrophy of bone in the neighborhood of inflammatory lesions. The patient went shortly to another hospital and there was treated with diathermy, with no relief. The second film, taken one and a half years later than the first one, shows a more advanced atrophy.

The decalcification of bone seen in hyper-parathyroidism can be excluded here by the pathological findings both macro- and microscopically. The decalcification here is simply part of the bone atrophy in general. Bone atrophy is a very important subject, especially since the advent of the x-ray. In the early days of radiography, confusion sometimes arose. One of my early confusions was what seemed to be a cavity in the head of the humerus in a case of chronic subdeltoid bursitis. In this case the supposed cavity represented a very atrophic condition in which the medullary and spongy tissue of the head was replaced by fatty tissue; this being so marked at times that the condition is spoken of as lipomasia. An extremely acute bone atrophy is seen in the carpal and tarsal bones in acute arthritis of the carpal and tarsal articulations. Here the bones are surrounded by multiple acute arthritis and atrophy is sometimes so pronounced that osteomyelitis has been confused with the clinical condition. It is said that acute gonorrheal arthritis is accompanied by the most marked atrophy. It is difficult to classify the atrophy in the case I have shown; decalcification is present only as an accompaniment of the general atrophy. Acute inflammation as a cause was absent.

We have had 25,000 cases of fracture at the St. Paul City Hospital in the last ten years and no atrophy of this kind has been seen.

Sudek theorized as to the neuropathic nature of acute bone atrophy but it would seem as though we are still in the dark in cases of the kind reported.

Dr. Henderson (in closing): I wish to thank Dr. Colvin for his discussion. His case appears to be very similar to the one I am reporting but, fortunately, only one bone was involved. Atrophy of the bone occurs more commonly in the foot and ankle and the usual story given by the patient is that he has bumped his ankle or foot against some object and did not pay much attention to it, but that in a few days the foot became sore and he began to limp. When it comes to treatment, the worst thing that could be done is to put the affected part at rest in a splint or cast. These patients should be encouraged to use the foot to the point of toleration. Industrial cases are slow to recover, much slower than the case of a man on the farm who is receiving no compensation. The treatment should be conservative and should consist of physical therapy with the institution of active and passive movement, heat and gentle massage. The prognosis is good, but the length of time before full recovery takes place varies, in the foot, from six months to one and one-half years.

SPINAL CORD INJURIES

E. M. Hammes, M.D.
Saint Paul

Abstract

Spinal cord injuries, similar to brain injuries, are occurring in rapidly increasing numbers, due particularly to high speed automobile accidents. During the past four years, 154 cases of fracture of the vertebræ (cervical 51, dorsal 36, lumbar 67) were admitted to the surgical service at the Ancker Hospital, a fairly large percentage presenting neurological symptoms of variable degree. To these must be added the cases of spinal cord injury without fractures, such as spinal concussion, hematomyelias, and penetrating wounds.

Spinal concussion is a definite clinical entity as has been clearly pointed out by Gordon Holmes in his studies during the World War. The hematomyelias are more prone to manifest themselves in the gray matter of the spinal cord, the incomplete transverse lesion develops very suddenly, and the prognosis is usually more favorable than the acute clinical syndrome warrants. Surgery is contraindicated in concussion and hematomyelia, but therapeutic spinal drainage may be of benefit.

The subdural hematomas rarely occur in pure form and are usually complicated by a hematomyelia or cord trauma. Fracture dislocation of the vertebra, with associated spinal cord injuries, presents a varied syndrome depending upon the level of the lesion and the extent of trauma to the cord. Laminectomy is definitely indicated in only a small percentage of this group, for most cases will improve as much with conservative treatment as with surgical intervention.

Among the delayed manifestations of spinal cord and root involvement due to vertebral traumas, Krummell's post-traumatic spondylitis and the herniation of the nucleus pulposus are the most frequent. Orthopedic measures in the first, and surgical removal of the nucleus in the second group, offer the best outlook for recovery.

Cases of spinal concussion, hematomyelia, fracture-dislocation with cord injury, and so forth, are reported.

Discussion

Dr. George N. Ruhberg (St. Paul): Dr. Hammes has covered such a wide field that it is difficult to adequately discuss it. I would reiterate the importance of x-rays in all spinal injuries. Occasionally unsuspected and surprising things are found. Sometimes the obvious injuries, such as bruises, cuts, etc., draw the entire attention of the attending physician and only later with x-ray studies are fractures of the spinal column found.

Referring to Dr. Hammes' case of hematomyelia involving the arms, this brings to my mind a friendly difference of opinion regarding the case. I saw this young lady quite some time after she left the hospital and at that time it appeared to me to be a predominately peripheral paralysis involving the left upper arm and shoulder. In view of that picture and the subsequent course I am still of that opinion. This case also illustrates the value of time in coming to a conclusion about the ultimate prognosis in nerve injuries.

Dr. M. S. Henderson (Rochester): I am very much interested in the cases which Dr. Hammes is reporting. They are a trying lot of cases to treat. The hematomyelia group are the ones that do make improvement and sometimes attain full recovery. I recently heard of a way of applying skeletal traction to the high cervical fractures advanced by Dr. Claude C. Coleman of Richmond, Virginia. He devised special tongs which are inserted in little holes made in the outer layer of the skull and in that way, firm and steady traction is maintained. We are all well acquainted with the extreme difficulty that we have in maintaining traction in cervical fractures by aid of some form of cloth or leather halter. They are not only inefficient but very uncomfortable. Skeletal traction is the ideal form of traction and if it can be used safely in this manner it will bring comfort to both patient and surgeon.

Dr. F. R. Wright (Minneapolis): It seems to me that the most remarkable case presented by Dr. Hammes was the one which, following an injury of the neck, had a paralysis of both arms with normal motion and sensation in the lower part of the body. The injury must produce local damage in the cord similar to that in poliomyelitis which attacks one group of nerves. Professor Jones, of Liverpool, states that, following an attack of poliomyelitis, the fibers in the nerves degenerate and that when repair takes place these fibers regenerate at the rate of approximately an inch a month. It would seem to me reasonable that regeneration following a localized injury in the cord should take place approximately in the same manner and in the same time. Since Dr. Hammes says that she recovered in 13 months, either complete regeneration of the nerve fibers did not take place, or regeneration occurred more rapidly than in a case of poliomyelitis.

In this connection I would like to report a case. Within the last thirty days I have called to see a man who, about three years ago, was thrown from a horse and his back injured. Dr. Geist did a laminectomy on him. Following this operation he recovered so that he was able to walk around his farm. About a year ago he developed a perinephritic abscess which was drained, and still drains. He has been in bed practically ever since. When I first saw him he was lying in bed and looked perfectly well. I asked him if he was paralyzed and he said no; but on examination there was only 15 to 20 per cent motion in the legs. The skin from the knees down was pale, soft and smooth and had the feeling of fine Morocco leather. In spite of the fact that he is a hairy individual, every hair below his knees has disappeared. This man has a slowly ascending atrophy of the skin as a late result of this cord injury.

Dr. Hammes (closing): I wish to thank the members for their kind discussion. In reply to Dr. Ruhberg's diagnosis that the patient with bilateral upper extremity paralysis might be due to a brachial neuritis, I cannot conceive how a person, receiving a sudden blow to the back of the neck and immediately following it developing a motor paralysis of both upper extremities, could have a traumatic neuritis. The fact that the electric reaction was one of degeneration in the paralyzed muscles does not speak against a lesion in the anterior gray matter in the cervico-dorsal region. An electric reaction of degeneration does occur whenever any part of the lower motor neuron is involved. This extends from the anterior horn cells to the motor end plates.

REFLEX URINARY FREQUENCY

F. R. Wright, M.D.
Minneapolis

Dr. Wright reported a case of reflex urinary frequency.

Abstract*

Mrs. S. came to me on January 8, 1935, complaining of frequent urination and a heavy feeling of pressure in her pelvis.

The patient is thirty-six years old, weighs 140 pounds, has always been in good health, is married and has two children, thirteen and eleven years of age, both deliveries being normal. One year after her second child was born (that is, ten years ago) she began having a feeling of weight and pressure in her pelvis accompanying her menstrual period. At the same time she developed a leukorrhea. These pelvic symptoms have increased during the last few years until the pressure pain in her pelvis during her menstruation has become almost unbearable and the leukorrhea has increased so that she is compelled to wear a napkin most of the time. Menstrual flow is normal and unaccompanied by any pain or distress.

About four or five years ago she began to have a colicky pain in the region of the umbilicus. This pain was referred from the umbilicus to the rectum. These attacks of umbilical pain have occurred every few months but have not been of long duration, 15 or 20 minutes, though severe enough to compel her to leave her work and lie down.

On January 2, 1935, the patient had an attack of umbilical pain which lasted only about ten minutes. On January 6, she began to have frequent urination, increasing in severity until on January 8, when I first saw her, she was voiding her urine every thirty minutes, day and night. She was having so much pain and pelvic distress that I did not undertake to make a pelvic examination and was unable to obtain a specimen of urine. Her temperature was 98.6°, pulse 80.

At this time she was given a sedative, told to take prolonged hot douches, and to come and see me again in a day or two. She returned on January 11. The

---

*Complete report in October, 1935, issue of *Urologic and Cutaneous Review*.

pain was less severe but she was still voiding at very frequent intervals. Temperature 98.6°, pulse 80.

At this second visit a pelvic examination was made but nothing pathological could be detected. The uterus was in normal position, there was no thickening or tenderness in the region of the tubes. At this time I examined her abdomen and found a very slight tenderness, on deep pressure, in the region of McBurney's point. There was no muscular rigidity or spasm. She denied ever having had any pain in her abdomen except the colicky pains in the region of the umbilicus, and stated that never at any time had she had any soreness or tenderness in the region of McBurney's point.

A diagnosis of exacerbation of a chronic appendicitis was made and operation advised.

She entered the hospital on January 14 and was operated on the 16th. In the hospital her temperature was 98°, pulse 80, respiration 20, white cell count, 10,600. The urine was reported to be hazy and contained a moderate number of pus cells. She was operated through a median incision. Pelvic examination showed the uterus, tubes and ovaries to be normal. A retrocecal appendix, 6 cm. long, was removed. Laboratory diagnosis: Subacute appendicitis.

The only local treatment received during her stay in the hospital was irrigation of her bladder on the third and fifth days with a hot 1/3000 permanganate solution. The patient left the hospital on the tenth postoperative day, free from all pelvic symptoms.

I did not see her again until about five months after her operation. When I asked her how she was feeling she said she was in perfect health and added that not only her bladder symptoms but also all of the feeling of pain and pressure which had accompanied her menstrual periods for ten years as well as the leukorrhea had disappeared.

Discussion

Dr. A. E. Benjamin (Minneapolis): I think we all have seen cases such as Dr. Wright reports. I recall a patient I operated on who could not go fishing because, if he did, he would usually have a pain in his abdomen. He also had albumin in the urine and could not get insurance. We removed his appendix, after which the albumin disappeared from his urine.

In cases of dysmenorrhea, often the symptoms are reflex or associated with an appendix attached to a tube or ovary. I have seen cases where the appendix was attached to the bladder; also where it was found fixed over the ureter, which resulted in pus in the urine.

Dr. Wright (closing): I might add that I had a brother who, for years, had a backache. He finally went to Dr. Geist, who went over him thoroughly and said the only thing he could find wrong was a slight tipping of his pelvis, the right side being lower than the left. He gave him a pad one-half an inch thick to wear in the heel of his right shoe. This improved, but did not entirely relieve, his backache. He wore this pad for ten years, when he was awakened in the night with a pain in his abdomen and before morning his appendix, which had never before bothered him, was removed. Much to his surprise, when he got up and around, his backache had disappeared, never to return.

The meeting adjourned.

R. T. LaVake, *Secretary.*

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

Obstetrical Practice. Alfred C. Beck, M.D., Professor of Obstetrics and Gynecology, Long Island College of Medicine, etc. 702 pages. Illus. Price, cloth, $7.00. Baltimore: Williams & Wilkins Co., 1935.

Uber Die Rhythmik Der Leberfunktion, Des Stoffwechsels Und Des Schlafes. Erik Forsgren. 56 pages. Illus. Stockholm: Isaac Marcus Boktryckeri-Aktiebolag, 1935.

Behavior Development In Infants. Evelyn Dewey. 321 pages. Price, cloth, $3.50. New York: Columbia University Press, 1935.

Russell A. Hibbs. George M. Goodwin. 136 pages. Illus. Price, cloth, $2.00. New York: Columbia University Press, 1935.

SURGERY OF A GENERAL PRACTICE. Arthur E. Hertzler, M.D., and Victor B. Chesky, M.D., 602 pages. Illus. Price $10.00. St. Louis: C. V. Mosby Co., 1934.

This edition is an enlargement of the author's previous "Minor Surgery." It deals chiefly with simple descriptions of procedures applicable to office and home. The various subjects are treated according to regions of the body; for example: Infections of the jaw, mouth and tongue; infections of the neck; diseases of the chest (including injuries), anal region, genitals, et cetera. Vascular diseases are discussed, particularly varicose veins.

A brief résumé of the chapters follows:

In the chapter on wounds and hemorrhage a very elementary description of the different types of wounds is given. Hemorrhage is considered with treatment chiefly by means of control. A suggestion of transfusion is given but no mention of methods of technic is made. In closing the chapter, the author says: "If you must put something in the veins, a glucose solution is more easily used."

In the chapter on infections, erysipelas is discussed with mention of the usual local treatment. The author states the value of serums in question. There is no mention of ultra-violet treatment. Likewise, in the discussion of gas gangrene, no mention is made of the use of serums in treatment. An excellent description is given of cellulitis.

On the care of wounds a very good descriptive method of treatment is given, with illustrations. The methods described are those the author has found useful and successful in his practice. A lacerated wound of the palm is shown, treated with a gauze drain between the flaps after suturing. This, though contradictory to the teaching of Boehler and others, is probably equally good in the author's hands.

The entire book is filled with illustrations, which, of course, is a great aid in differential diagnosis and in making technic more understandable. This volume is well worth adding to the general practitioner's library.

MODERN HOME MEDICAL ADVISER. Your Health and How to Preserve It. Edited by Morris Fishbein, M.D. Price $9.50. 905 pages with 140 illustrations. New York: Doubleday, Doran and Co., Inc., 1935.

How much demand there is nowadays for a family health book remains to be seen. Some maintain that the laity is too much informed on medical subjects. However, many intelligent citizens, parents particularly, ask their medical advisers questions about health and disease. For them this volume affords a ready reference book of authentic medical knowledge, written, as it is, by medical authorities.

Dr. Fishbein, in addition to being editor of the volume, has contributed chapters on Choice of Physician, the Family Medicine Chest, First Aid, Hygiene of Women, the Prevention and Treatment of Infectious Diseases, Transmittable Diseases, the Respiratory Diseases, Rheumatism, Eye, Ear, Nose and Throat, Venereal Disease, Care of the Teeth, and Old Age.

It is impossible to review each chapter in a brief report. However, the handling of Sex Hygiene, by Thurman B. Rice, deserves special mention as it is a masterful treatment of a difficult subject. There is much need for a dissemination of the sane, plain spoken and yet idealist views expressed in this chapter. It is noticeable that the writer finds objections to all of the contraceptives mentioned. One may be surprised, too, that in Dr. Fishbein's chapter on Hygiene of Women the safe period for prevention of conception is given with such assurance.

Mothers will find valuable information on the care of mothers before and after childbirth and on the care and feeding of children, although the latter subject is not as completely handled as in books available on this subject. The chapters on infectious diseases are also available for ready reference.

While the chapters on kidney disease and the special senses are rather too detailed for a lay volume, those on allergy, deficiency diseases and internal glands are of timely interest.

Nervous and mental disorders are briefly but well handled by Dr. George K. Pratt, and the importance of the proper training of children in the prevention of later mental disease is emphasized. This chapter and the one on Sex Hygiene both emphasize the high calling of motherhood as a career, a fact not fully realized.

While parts of the volume will serve merely for reference, much will be found interesting and very instructive to adults, especially parents. It is not a book which most parents will feel like having accessible to their children.

C. B. Drake, M.D.

The National Formulary, Sixth Edition

The American Pharmaceutical Association announces that its Council has officially approved December 16, 1935, as the date when the new N. F. VI will be released for sale in all parts of the country, and has also approved June 1, 1936, as the date when the N. F. VI will become official and will supersede the N. F. V.

As previously announced, the N. F. VI will be distributed for the Association by the Mack Printing Company of Easton, Penn.

The new National Formulary represents a complete and thorough revision of N. F. V. Admissions and deletions are based on information obtained in the U. S. P.-N. F. Prescription Ingredient Survey. This survey was made to determine the materials prescribed and the extent of their use throughout the country. The N. F. VI, therefore, supplements the scope of the Pharmacopœia and supplies additional information on simples, formulas, diagnostic reagents and standards required by the pharmacist in the practice of his profession.

Of the 689 monographs in the N. F. VI, 208 are Drug or Chemical Monographs and 481 are Monographs of Pharmaceutical Preparations. The more important additions have been in the monographs for ampuls, tablets, fluidextracts, syrups, tinctures and ointments.

Vitamin D in Common Foods

The sources of vitamin D or vitamin D effects are now so easily available and so widely distributed that the question of an adequate supply would hardly seem to concern greatly any average American. Nevertheless, pediatricians who see constantly the effects of an inadequate supply of vitamin D are inclined to deprecate the manner in which vitamin D is made available and in which it is used by the vast majority of people. A recent survey on the amounts of vitamin D in common foods indicates that, with the exception of egg yolk and butter, none of the ordinary foods contain any substantial amount of vitamin D. Few human beings in large Northern cities obtain any substantial amount of sunshine except possibly in summer. The main source of vitamin D must therefore come to the human being from exposure to ultraviolet rays, from natural sources of this vitamin or from extra vitamin D obtained through materials that have been enhanced in their vitamin D potency. Nutritional authorities believe that man has been deprived of the vitamin D that he used to get by natural methods and that insistence or an additional source of this vitamin will be for the benefit of mankind. Certainly, so far as the growing child is concerned, some additional vitamin D may be necessary everywhere. Quite recently the thought that an oversupply of vitamin D would be developed in this manner and that the eventual effects of this oversupply would be toxic has been reemphasized in various places. Thus far the evidence seems to indicate little likelihood of harm. (J. A. M. A., Oct. 26, 1935, p. 1354.)

INDEX TO VOLUME 18

A

Abscess, Anal, and anal fistula, 655
Acute atrophy of bone (abstract), 814
Acute fractures of the spine, 88
Acute perforations of the gastro-duodenal area, with special reference to those of traumatic origin (case report), 238
Adenocarcinoma, Papillary colloid, of the extrahepatic bile ducts (case report), 460
Adenoma, A basophilic, of the pituitary gland, 73
Adrenal gland, The present status of our knowledge of the, 66
Adson, Alfred W., Brown, George E., and Craig, Winchell McK.: The treatment of severe essential hypertension, 134
Alexander, H. L.: The present status of clinical allergy, 773
Allergic child, The care of the, 292
Allergy, clinical, The present status of, 773
Allison, R. G.: Pathological fractures, 187
Ambulant treatment of hernia, The, 441
Ambulant treatment of varicose veins by ligation, division and injection of the distal segment, The, 592
Amebiasis: Diagnosis, prevention and treatment, 515
Anal abscess and anal fistula, 655
Anderson, Carl M.: Some observations on the intranasal operation for frontal sinusitis, 744
Anemia, Idiopathic hypochromic, 504
Anesthesia, Current events in, 261
Aneurysms, arterio-venous, and cavernous hemangiomas, The treatment of some types of, 260
Aneurysm, Traumatic arteriovenous, of right superficial temporal artery and vein (case report), 158
Angioid streaks of the retina associated with pseudoxanthoma elasticum, 599
Ankle, Intra-articular fractures of the, resulting from indirect violence, 97
Annual symposium on cancer, Minneapolis Surgical Society, 409 and 481
Annual symposium on fractures, Minneapolis Surgical Society, 183
Arterio-venous aneurysms and cavernous hemangiomas, The treatment of some types of, 260
Arthritis, painful ankylosing, Late results in a case of arthroplasty of both hip joints for, 553
Arthrodesis, Subastragaloid and triple, 260
Arthroplasty of both hip joints for painful ankylosing arthritis, Late results in a case of, 553
Ascites of indeterminate origin, 510
Attempted suicide, 148

B

Bacon, Donald K.: Blood transfusion in the treatment of sepsis, 30
Balfour, Donald C.: The evaluation of the treatment of duodenal ulcer, 554
Bargen, J. Arnold, and Brust, John C. M.: Chronic ulcerative colitis among elderly persons, 583
Barry, L. W.: Dysmenorrhea, 525
Basophilic adenoma of the pituitary gland, A, 73
Baxter, S. H.: Melanoma, 409
Beard, Richard Olding: Graduate medical education of certain sorts in Minnesota, 557
Berdez, George L., and Collins, Arthur N.: Ossifying hemangio-endothelioma (case report), 157
Berrisford, Paul D.: Herpes zoster ophthalmicus, 741
Bieter, Raymond N.: Medical aspects of the commoner industrial poisonings, 234
Bile ducts, extrahepatic, Papillary colloid adenocarcinoma of the (case report), 460
Biliary tract, Visualization of the, by injection of radio-opaque media postoperatively, 259
Binger, Melvin W., and Keith, Norman M.: Ascites of indeterminate origin, 510
Biological phenomena in Hodgkin's disease, 263
Birnberg, T. L.: Mumps meningo-encephalitis, 377
Blood pressure, The effects of sodium and potassium salts on carbohydrate metabolism and, 257
Blood transfusion in the treatment of sepsis, 30
Bone, Acute atrophy of (abstract), 814
Borderline between neuropsychiatry and general medicine, The, 26
Borg, Joseph F.: Hyperparathyroidism, 65
Boyer, Samuel H., Jr.: Idiopathic hypochromic anemia, 504
Braasch, William F.: Transurethral prostatic resection, 224
Bratrud, A. F.: The ambulant treatment of hernia, 441
Breast, Ten years of surgery for cancer of the, 131
Briggs, John Francis, and Oerting, Harry: Influence of gastric lavage on familial and non-familial erythremia, 499
Broken nose, The, 101
Brown, George E.: Disturbances in peripheral circulation, 139
Brown, George E., Craig, Winchell McK., and Adson, Alfred W.: The treatment of severe essential hypertension, 134
Brown, Percy: The inception and development of fluoroscopy: The influence of Carman on its status in America, 699
Brown, Philip W., and Magath, Thomas B.: Amebiasis: diagnosis, prevention and treatment, 515
Brust, John C. M., and Bargen, J. Arnold: Chronic ulcerative colitis among elderly persons, 583
Burch, Frank E.: Retinal detachment, 201

Book Reviews

American Medical Association: Annual reprints of the reports of the Council on Pharmacy and Chemistry (1934), 559
American Medical Association: Apparatus accepted by the Council on Physical Therapy, 760
American Medical Association: New and non-official remedies (1935), 694
American Pharmaceutical Association: National formulary, sixth edition, 818
Anspach, Brooke M.: Gynecology, 64
Babcock, W. Wayne: Textbook of surgery, 490
Broomhead, R.: A summary of the treatment of fractures and dislocations, 419
Brown, Lawrason: Rules for recovery from pulmonary tuberculosis, 64
Clendenning, Logan: Methods of treatment, 328
Collins, Wm. S.: System of diet writing, 693
Colwell: Daily log for physicians, 130
Dunbar, H. Flanders: Emotions and bodily changes, 693
Elmer, Warren P.: Physical diagnosis, 693
Fishbein, Morris (editor): Modern home medical adviser, 818
Gibb, W. T.: Minor surgery in general practice, 268
Goldthwait, Joel E.: Body mechanics in the study and treatment of disease, 268

Goldzieher, Max: Practical endocrinology, 268
Harnes, Alvin R.: Clinical management of syphilis, 420
Hatcher, Robert A., and Eggleston, Cary: Useful drugs, 328
Hertzler, Arthur E., and Chesky, Victor B.: Surgery of a general practice, 817
Kessler, Henry H.: The crippled and disabled, 329
Loeb, Robert F.: Martinis' principles and practice of physical diagnosis (translated by George J. Farber), 330
Miller, C. Jeff: Clinical gynecology, 328
Pardee, Harold E. B.: What you should know about heart disease, 329
Pemberton, Ralph: Rheumatoid conditions and chronic arthritis, 692
Prinz, Herman: Diseases of the mouth and their treatment, 490
Springstun, Humphreys: Doctors and juries, 490
Sutton, Richard L.: Introduction to dermatology, 329
Sutton, Richard L., and Sutton, Richard L., Jr.: Diseases of the skin, 419
Tandy, Elizabeth C.: Comparability of maternal mortality rates in the United States and certain foreign countries, 329
Zinsser, Hans: Textbook of bacteriology, 64

C

Campbell, Orwood J.: The treatment of fractures of the lower end of the humerus, 192
Cancer, Annual symposium on, Minneapolis Surgical Society, 409 and 481
Cancer of the breast, Ten years of surgery for, 131
Carcinoma of the colon, Pathologic factors in the curability of, 212
Carcinoma of the rectum and sigmoid, Electrocoagulation of, 487
Carcinoma of the stomach, 484
Carcinoma of the stomach, The modes of onset and symptoms of, 586
Carcinoma, Tumors simulating — Schüller-Christian's disease or xanthomatosis, 627
Cardiac emergencies, Treatment of, 455
Care of the allergic child, The, 292
Carlson, Herbert A.: Variations in the technic of thoracoplasty, 262
Carpal navicular bone, Fractures of the, 81
Cerebral vascular crises, 436
Cesarean section, A study of the mortality of premature infants delivered by, 590
Chatterton, C. C.: Acute fractures of the spine, 88
Cholecystography by the oral method, Value of, with an analysis of 189 operated cases, 269
Christianson, Harry W.: Anal abscess and anal fistula, 655
Chronic ulcerative colitis among elderly persons, 583
Church, Gerald T., and Walters, Waltman: Gastritis, a phenomenon of pyloric obstruction and its relation to duodenal ulcer, 206
Circulation, peripheral, Disturbances in, 139
Clefts, Congenital, of the face and jaws (discussion), 406
Clinical application of the ovarian follicular hormone, The, 69
Clinical studies in juvenile rheumatism, 370
Clinical tuberculosis among employes of local institutions caring for tuberculosis patients, 452
Cole, Wallace H., and Williamson, George A.: Fractures of the carpal navicular bone, 81
Colitis, Chronic ulcerative, among elderly persons, 583
Collins, Arthur N., and Berdez, George L.: Ossifying hemangio-endothelioma (case report), 157
Colon, Diverticulosis and diverticulitis of the, 319
Colon, Pathologic factors in the curability of carcinoma of the, 212
Community versus tuberculosis, The, 561
Congenital clefts of the face and jaws, The (discussion), 406
Congenital obstruction of the third portion of the duodenum in a two year old boy. Operation with recovery, 60
Continuous intravenous infusion, 778
Coronary sclerosis, Electrocardiography as a diagnostic adjunct in the anginal syndrome of, 20
Contribution to our understanding of the mechanism of hypertensive encephalopathy and treatment in a certain group of these cases (discussion), 406
Convalescent Serum Center, The Milwaukee, 541
Coronary occlusion, The prognosis and treatment of, 710
Correlation of x-ray heart shadows with clinical and autopsy findings, 724
Counseller, Virgil S., and Randall, Lawrence M.: Treatment of pelvic inflammation by heat: indications and results, 1
Coventry, W. A., Photograph, 35
Coventry, W. A., and Moe, Russell J.: Ten years of surgery for cancer of the breast, 131
Craig, Winchell McK., Adson, Alfred W., and Brown, George E.: The treatment of severe essential hypertension, 134
Creevy, C. D.: Litholapaxy, 262
Criteria of operability for goiter, 631
Current events in anesthesia, 261
Cutis verticis gyrata formation, 536
Cutler, Elliott C.: Total thyroidectomy for heart disease, 421

CORRESPONDENCE

Aitkins, H. B., 46
Goldstein, Hyman I., 170

D

Davis, William: The diamond jubilee of the Ramsey County Medical Society, 386
Detachment of the retina (moving picture demonstration), 258
Diabetic gangrene, Report of three cases of, 127
Diamond jubilee of the Ramsey County Medical Society, The, 386
Disability estimation, Fracture, 195
Disturbance in function of the parathyroid glands of children, 107
Disturbances in peripheral circulation, 139
Diverticulosis and diverticulitis of the colon, 319
Dunn, George R.: Treatment of fractures of the os calcis, 183
Duodenum, Congenital obstruction of the third portion of, in a two year old boy. Operation with recovery, 60.
Duodenum, Non-operative treatment of localized perforations of the (abstract), 477
Dysmenorrhea, 525

E

Earl, Robert: Treatment of head injuries, 521
Effects of early postoperative feeding, The, 382
Effects of sodium and potassium salts on carbohydrate metabolism and blood pressure, The, 257
Eitel, George D.: Fracture dislocation of the shoulder, 191
Eitel, George D.: Ingested foreign bodies in the gastrointestinal tract requiring surgical removal, 52
Elbow, Supracondylar fractures of the, and their complications, 597
Electrocardiography as a diagnostic adjunct in the anginal syndrome of coronary sclerosis, 20
Electrocoagulation of carcinoma of the rectum and sigmoid, 487

Embolism, Pulmonary fat, 636
Engberg, E. J.: The palliative treatment of tic douloureux, 229
Eruptions, Phenolphthalein, 782
Erythremia, familial and non-familial, Influence of gastric lavage on, 499
Esophagus, Localization of bones in the, by roentgenoscopy (case report), 240
Essential hypertension and tuberculosis, 738
Essential thrombocytopenic purpura, 15
Evaluation of the treatment of duodenal ulcer, The, 554
Evans, Edward T.: The treatment of non-union fracture of the hip, 93
Exley, E. W.: Unusually large bilateral renal calculi (case report), 303
External fronto-ethmo-sphenoid operation, The, 786

EDITORIAL

A. M. A. delegates meet, 161
Annals of medical history, 244
Bone marrow biopsy, 798
Canucks and Yanks meet, 465
Cigarette smoking, 37
Clinic criticized, 244
Convalescent serum centers, 543
Council on Pharmacy and Chemistry, 799
Demonstrations at the state meeting, 544
Dinitrophenol, 601
Editorial staff increased, 160
Editor's dilemma, 306
Extension courses, 306, 670
Fifty years after Trudeau, 36
Football injuries, 602
Great leader (Dr. Herman M. Johnson), 466
Hay fever in 1935, 748
In memoriam, 112
McCrae, Thomas, 671
May Day and diphtheria immunization, 244
Medical solidarity, 160
New tests of hepatic function, 464
Part-pay and full-pay patients, 748
Poliomyelitis in 1935, 670
Ramsey County diamond jubilee, 386
Scarlet fever incidence, 305
Simplified diphtheria prevention, 111
Snake bite, 603
Social idealism, 111
Socialization of medicine, 797
State meeting, The, 385
State sickness insurance, 36
"Throw-away" medical magazines, 749
Tularemia, 601
Typhoid increase, 543
Vitamin D milk, 243
Wilder, Lucretia, memorial, 305

F

Factors contributing to the further reduction of tuberculous infection, 280
Fahr, George: A contribution to our understanding of the mechanism of hypertensive encephalopathy and treatment in a certain group of these cases (discussion), 406
Fatigue, Non-organic causes of, 531
Feeding, early postoperative, The effects of, 382
Femur, Fractures of the neck of the, 185
Fibula, Fractures of the shaft of the tibia and, 94
Fistula, anal, Anal abscess and, 655
Fluoroscopy, The inception and development of: The influence of Carman on its status in America, 699
Foley, Frederic E. B.: Operative division of the horseshoe kidney, 176
Foreign bodies, Ingested, in the gastro-intestinal tract requiring surgical removal, 52
Foreign body, An unusual pharyngo-esophageal, and its removal (case report), 304
Fowler, L. Haynes, and Hanson, William A.: Megacolon, 646
Fowler, L. H., and Hanson, W. A.: Tumors simulating carcinoma—Schüller-Christian's disease or xanthomatosis, 627
Fracture disability estimation, 195
Fracture dislocation of the shoulder, 191
Fracture, Malunited, of the lower end of the radius (Colles' fracture) treated by osteotomy, 84
Fracture, non-union, of the hip, The treatment of, 93
Fractured vertebræ, 189
Fractures, Acute, of the spine, 88
Fractures, Annual symposium on, Minneapolis Surgical Society, 183
Fractures, fresh, of the hip, Treatment of, 91
Fractures, Intra-articular, of the ankle resulting from indirect violence, 97
Fractures of the carpal navicular bone, 81
Fractures of the lower end of the humerus, The treatment of, 192
Fractures of the lower end of the radius, 78
Fractures of the neck of the femur, 185
Fractures of the os calcis, Treatment of, 183
Fractures of the shaft of the tibia and fibula, 94
Fractures of the skull, Prognosis in, 187
Fractures of the upper end of the tibia involving the knee joint, 186
Fractures, Pathological, 187
Fractures, Supracondylar, of the elbow and their complications, 597
Fricke, Robert E.: The radium treatment of nonmalignant conditions, 789
Froehlich, H. W., and Henrikson, E. C.: Sodium ricinoleate as a sclerosing agent, 594
Fronto-ethmo-sphenoid operation, The external, 786
Fundus examination in short wave-length light (abstract), 175

G

Gall bladder disease, 123
Gangrene, cutaneous, following scarlet fever, Multiple areas of, 154
Gangrene, diabetic, Report of three cases of, 127
Gastric lavage, Influence of, on familial and non-familial erythremia, 499
Gastritis, a phenomenon of pyloric obstruction and its relation to duodenal ulcer, 206
Gastro-duodenal area, Acute perforations of the, with special reference to those of traumatic origin (case report), 238
Geer, Everett K.: Oleothorax: a report of its use in twenty cases, 576
General medicine, The borderline between neuropsychiatry and, 26
Gillespie, M. G.: The ambulant treatment of varicose veins by ligation, division and injection of the distal segment, 592
Goetsch, Emil: Criteria of operability for goiter, 631
Goiter, Criteria of operability for, 631
Graduate medical education of certain sorts in Minnesota (abstract), 557
Gray, Howard K.: Postoperative pulmonary complications and postoperative use of the Trendelenburg position, 273
Grimes, Burton P., and Michael, Joseph C.: Attempted suicide, 148
Gross structural changes in the adult heart and aorta as seen in the roentgen ray film and their correlation with clinical and autopsy findings (abstract) 475

H

Hammes, E. M.: Cerebral vascular crises, 436
Hammes, E. M.: Spinal cord injuries (abstract), 815
Hanson, William A., and Fowler, L. Haynes: Megacolon, 646

Hanson, W. A., and Fowler, L. H.: Tumors simulating carcinoma—Schüller-Christian's disease or xanthomatosis, 627
Hardgrove, Maurice: The Milwaukee Convalescent Serum Center, 541
Hart, Vernon L.: Intra-articular fractures of the ankle resulting from indirect violence, 97
Hart, Vernon L.: Subastragaloid and triple arthrodesis, 260
Hastings, D. R.: The safeness of artificial pneumothorax as therapeutic treatment in pulmonary tuberculosis, 580
Hawkinson, L. F.: The clinical application of the ovarian follicular hormone, 69
Head injuries, Treatment of, 521
Heart and aorta, adult, Gross structural changes in the, as seen in the roentgen ray film, and their correlation with clinical and autopsy findings (abstract) 475
Heart disease, Total thyroidectomy for, 421
Heart shadows, x-ray, Correlation of, with clinical and autopsy findings, 724
Hedberg, G. A.: A study of tuberculosis in families, 276
Hemangio-endothelioma, Ossifying (case report), 157
Hemangiomas, cavernous, The treatment of some types of arterio-venous aneurysms and, 260
Hemorrhage in obstetrics, 4
Henderson, M. S.: Acute atrophy of bone (abstract), 814
Henrikson, E. C., and Froehlich, H. W.: Sodium ricinoleate as a sclerosing agent, 594
Henry, Myron O.: Supracondylar fractures of the elbow and their complications, 597
Henry, Myron O.: Treatment of fresh fractures of the hip, 91
Hernias, abdominal, The use of living sutures in the repair of, 365
Hernia, The ambulant treatment of, 441
Hernia, The rationale of the injection treatment of, 623
Herpes zoster ophthalmicus, 741
Hilding, Anderson: Angioid streaks of the retina associated with pseudoxanthoma elasticum, 599
Hilding, Anderson C.: Lysozyme: One of the natural defense factors of the eye, 360
Hip, The treatment of non-union fracture of the, 93
Hip, Treatment of fresh fractures of the, 91
Hirschboeck, Frank J.: The borderline between neuropsychiatry and general medicine, 26
Historical notes of the Minnesota Valley Medical Association and the Southern Minnesota Medical Association, 491
History of the development of surgery for peptic ulcer, The, 351
Hochfilzer, John J.: Traumatic arteriovenous aneurysm of right superficial temporal artery and vein (case report), 158
Hodgkin's disease, Biological phenomena in, 263
Hoff, Alfred: Correlation of x-ray heart shadows with clinical and autopsy findings, 724
Hoff, Alfred: Gross structural changes in the adult heart and aorta as seen in the roentgen ray film and their correlation with clinical and autopsy findings (abstract), 475
Hoffman, Max H.: The present status of our knowledge of the adrenal gland, 66
Holmes, Fred G.: Tuberculosis, 560
Hormone, ovarian follicular, The clinical application of the, 69
Hormone, Suprarenal cortical, 71
Horseshoe kidney with complications, 61
Humerus, The treatment of fractures of the lower end of the, 192
Hyperparathyroidism (Borg), 65
Hyperparathyroidism (Webb), 664
Hypertension, Essential, and tuberculosis, 738
Hypertension, essential, The management of, 354
Hypertension, Malignant—splanchnic nerve resection (case report), 242
Hypertension, severe essential, The treatment of, 134
Hyperthyroidism in children, 50
Hyperinsulinism, The surgery of, 265
Hyperthyroidism and hyperparathyroidism, Some of the newer developments in, 761

I

Idiopathic hypochromic anemia, 504
Ikeda, Kano: Pulmonary fat embolism, 636
Inception and development of fluoroscopy: The influence of Carman on its status in America, 699
Infants, premature, delivered by cesarean section, A study of the mortality of, 590
Influence of gastric lavage on familial and non-familial erythremia, 499
Ingested foreign bodies in the gastro-intestinal tract requiring surgical removal, 52
Injection treatment of hernia, The rationale of the, 623
In Memoriam (see Obituary)
Insomnia, 143
Intra-articular fractures of the ankle resulting from indirect violence, 97
Intramedullary tumor of the spinal cord (case report), 462
Intravenous infusion, Continuous, 778

J

Jennings, Frank L.: Factors contributing to the further reduction of tuberculous infection, 280
Johnson, James A.: Electrocoagulation of carcinoma of the rectum and sigmoid, 487
Johnson, Norman: Non-organic causes of fatigue, 531
Jones, William R.: Diverticulosis and diverticultis of the colon, 319
Judd, E. Starr: The history of the development of surgery for peptic ulcer, 351

K

Kamman, Gordon R.: Insomnia, 143
Keith, Norman M., and Binger, Melvin W.: Ascites of indeterminate origin, 510
Kendall, Edward C.: Suprarenal cortical hormone, 71
Kennedy, Roger L. J.: Disturbance in function of the parathyroid glands of children, 107
Keratoma senile, Verucca senilis and, 735
Kidney, horseshoe, Operative division of the, 176
Kidney, Horseshoe, with complications, 61
Kidney injuries, Management of, 283
Knight, Ralph T.: Current events in anesthesia, 261
Koenigsberger, C.: Malignant hypertension—splanchnic nerve resection (case report), 242
Kohlbry, Carl O.: Essential thrombocytopenic purpura, 15

L

Lahey, Frank H.: Some of the newer developments in hyperthyroidism and hyperparathyroidism, 761
Laird, A. T.: Clinical tuberculosis among employes of local institutions caring for tuberculosis patients, 452
Lang, Leonard A.: Late toxemias of pregnancy, 287
Larson, Lawrence M.: Pathologic factors in the curability of carcinoma of the colon, 212
Late results in a case of arthroplasty of both hip joints for painful ankylosing arthritis, 553
Late toxemias of pregnancy, 287
La Vake, R. T.: Hemorrhage in obstetrics, 4
Laymon, Carl W.: Phenolphthalein eruptions, 782
Laymon, Carl W., and Sweitzer, S. E.: Multiple areas of cutaneous gangrene following scarlet fever, 154
Leven, N. Logan: Visualization of the biliary tract by injection of radio-opaque media postoperatively, 259

Lillie, Harold I., and Williams, Henry L.: The external fronto-ethmo-sphenoid operation, 786
Litholopaxy, 262
Localization of bones in the esophagus by roentgenoscopy, The, (case report), 240
Lysozyme: One of the natural defense factors of the eye, 360

Mc

McQuarrie, Irvine: The effects of sodium and potassium salts on carbohydrate metabolism and blood pressure, 257

M

Madden, John F.: Cutis verticis gyrata formation, 536
Magath, Thomas B., and Brown, Philip W.: Amebiasis: diagnosis, prevention and treatment, 515
Malignancy, Organization of hospital service for diagnosis and treatment of, 481
Malignant hypertension—splanchnic nerve resection (case report), 242
Malignant tumors of the thyroid gland, 412
Malignant tumors of the urinary tract, 416
Malunited fracture of the lower end of the radius (Colles' fracture) treated by osteotomy, 84
Management of essential hypertension, The, 354
Management of kidney injuries, 283
Manson, Melville H.: Biological phenomena in Hodgkin's disease, 263
Masson, James C.: The use of living sutures in the repair of abdominal hernias, 365
Maxeiner, Stanley R.: Carcinoma of the stomach, 484
Medical aspects of the commoner industrial poisonings, 234
Medical economics, 39, 114, 163, 246, 308, 389, 468, 546, 606, 672, 720, 800
Megacolon, 646
Melanoma, 409
Menopausal and post-menopausal bleeding, 12
Merkert, Charles E.: Tetanus, 613
Metabolism, carbohydrate, and blood pressure, The effects of sodium and potassium salts on, 257
Meyerding, Henry W., and Overton, Lewis M.: Malunited fracture of the lower end of the radius (Colles' fracture) treated by osteotomy, 84
Michael, Joseph C., and Grimes, Burton P.: Attempted suicide, 148
Middleton, William S.: The prognosis and treatment of coronary occlusion, 710
Milwaukee Convalescent Serum Center, 541
Minnesota Valley Medical Association and Southern Minnesota Medical Association, Historical notes of the, 491
Modes of onset and symptoms of carcinoma of the stomach, The, 586
Moe, John H.: Fractures of the shaft of the tibia and fibula, 94
Moe, Russell J., and Coventry, W. A.: Ten years of surgery for cancer of the breast, 131
Moersch, Herman J.: An unusual pharyngo-esophageal foreign body and its removal (case report), 304
Montgomery, Hamilton: Verucca senilis and keratoma senile, 735
Morlock, Carl G.: Essential hypertension and tuberculosis, 738
Morrow, James: Acute perforations of the gastroduodenal area, with special reference to those of traumatic origin (case report), 238
Multiple areas of cutaneous gangrene following scarlet fever, 154
Mumps meningo-encephalitis, 377
Myers, Thomas: Pathologic conditions in the newborn, 658

MEDICAL ECONOMICS

Advice from Chicago, 390
Anti-vivisection is real menace—Dr. McEachern, 114
As to health insurance, 115
Chicago storm center, 311
College of Surgeons conforms, 469
Community is liable—Attorney General Peterson, 164
Concerning birth control, 754
Concerning the foundations, 167
Council meets, The, 41, 252, 550, 754
Counting sick men, 753
County officers meeting, 117, 247
County society plans, 389
Debating state medicine, 672
Delayed relief bills, 609
Detroit is grateful, 120
Distribution of physicians, 611
"Doorbell Census," 680
Doorbell survey in Minnesota, 751
Economical Ashland, 43
Fishbein, Dr., speaking, 39
For orderly progress, 807
For public health, 610
Getting ready to hunt illness, (Doorbell health survey), 800
Great meeting (82nd annual meeting M. S. M. A.), 468
High schools debate state medicine, 606
High school debates, 750
Hospitalization by county boards, 610
Hospital week-ends, 753
"How can a city say thank you?" 166
"Impatient facts" (Health survey), 801
Important (Change in method of handling relief), 469
Important to members (new laws)
  Hospitalization of the indigent, 393
  Reporting injuries inflicted by firearms, 393
Individual physician must help, 311
Inevitable reactions (Compulsory health insurance in California), 395
In explanation of the California situation, 309
In operation now (Special payment plans), 390
"Insurance studied," 680
List of physicians licensed, 253, 396, 612
May Day campaign, 310
Medical care of WPA workers, 608
Medical economics at Harvard, 313
Medical Pollyannas in California, 246
Medical practice in Utah, 119
Medical reporter (Oregon), 311
Medicine must lead, 43
Minnesota comes of age, 169
Minnesota's own handbook for debaters, 805
Minnesota State Board of Medical Examiners, 45, 169, 252, 314, 395, 472, 611, 756, 809
More about German Health Insurance, 394
Mr. Kingsbury leaves the Milbank Fund, 395
New plans (Special report by Dr. Leland of Bureau of Medical Economics, at A. M. A. meeting), 470
New policy (Summer round-up of children), 678
New prospects for public health in Minnesota, 801
New society (Dakota County), 472
New York's "gradient plan," 755
"No jump in the dark" (Social experiments), 246
Northwest Conference, 118, 250
On privileged information, 752
Optical code, 608
Passed by the House of Delegates (Minnesota State Medical Association), 546
Questionnaire (Compulsory sickness insurance), 308
Questionnaire (Health insurance), 115
Relief and WPA, 675
Report of the Judicial Council, 471
Report of the President (President Roosevelt's message on social security), 114
Seen by the Secretary, 44
SERA, 608
SERA education, 394
Shoulder to shoulder (British Columbia and Canadian Medical Associations—sickness insurance), 679
Sickness insurance—Mr. Witte, 312

Sickness insurance is huge octopus—C. W. Mayo, 607
Some causes of professional unrest, 116
Special session (A. M. A. House of Delegates), 163
State medicine—Glenn Frank, 679
State meeting, 120
Survey (medical relief), 677
Teaching economics, 472
To improve the public health, 166
Trend of legislative opinion, 468
Wadena's plan (relief problems), 677
Washington's plan, 807
Watch! (Surveys of health and medical services), 679
What can I do for my county and state medical society? 672, 750, 800
What the editors say, 755
What the masses want, 42
Who is to vaccinate—and where? 806

MISCELLANEOUS

Extension course in refraction, 171
War against tuberculosis, The, 63

N

Nathanson, M. H.: Treatment of cardiac emergencies, 455
Nelson, Harvey: Fracture disability estimation, 195
Neuropsychiatry and general medicine, The borderline between, 26
Newborn, Pathologic conditions in the, 658
Nonmalignant conditions, The radium treatment of, 789
Non-operative treatment of localized perforations of the duodenum (abstract), 477
Non-organic causes of fatigue, 531
Nordland, Martin: Hyperthyroidism in children, 50
Nordland, Martin: Malignant tumors of the thyroid gland, 412
Nose, The broken, 101

O

Obstetric care, Simplified, 768
Obstetrics, Hemorrhage in, 4
Obstruction, Congenital, of the third portion of the duodenum in a two year old boy. Operation with recovery. Case report, 60
Oerting, Harry, and Briggs, John Francis: Influence of gastric lavage on familial and non-familial erythremia, 499
Oleothorax: a report of its use in twenty cases, 576
Olson, F. A.: Organization of hospital service for diagnosis and treatment of malignancy, 481
Olson, Paul F., and Walters, Waltman: Papillary colloid adenocarcinoma of the extrahepatic bile ducts (case report), 460
Operative division of the horseshoe kidney, 176
Organization of hospital service for diagnosis and treatment of malignancy, 481
Orr, Thomas G.: Continuous intravenous infusion, 778
Os calcis, Treatment of fractures of the, 183
Ossifying hemangio-endothelioma (case report), 157
Osteotomy, Malunited fracture of the lower end of the radius (Colles' fracture) treated by, 84
Ovarian follicular hormone, The clinical application of the, 69
Overton, Lewis M., and Meyerding, Henry W.: Malunited fracture of the lower end of the radius (Colles' fracture) treated by osteotomy, 84

OBITUARY

Bullen, Frank Wright, 682
Caine, Arthur T., 682
Caldwell, Kenneth Simms, 46
Gates, C. E., 545
Halloran, Florence John, 170
Hedding, Joseph Albert, 122
Johnson, Herman M., 467, 545
Kilbourne, Arthur F., 122
Lewis, William W., 682
Lumley, William Alison, 397
McCloud, Charles Naumann, 605
Mann, Arthur T., 397
Miller, M. J., 467
O'Connor, Patrick Henry, 170
Smith, Edwin H., 605
Smith, E. K., 170
Swenson, Charles, 545
Wellcome, Jacob Welcome Bray, 122

P

Palliative treatment of tic douloureux, The, 229
Papillary colloid adenocarcinoma of the extrahepatic bile ducts (case report), 460
Parathyroid glands of children, Disturbance in function of the, 107
Pathological fractures, 187
Pathologic conditions in the newborn, 658
Pathologic factors in the curability of carcinoma of the colon, 212
Pelvic inflammation, Treatment of, by heat: indications and results, 1
Peptic ulcer, The history of the development of surgery for, 351
Perforations, Acute, of the gastro-duodenal area, with special reference to those of traumatic origin (case report), 238
Peterson, Thorvald: Gallbladder disease, 123
Peterson, Willard C.: Report of three cases of diabetic gangrene, 127
Peyton, William T.: The treatment of some types of arterio-venous aneurysms and cavernous hemangiomas, 260
Phenolphthalein eruptions, 782
Physicians, Side-view sketches of, 567
Piper, Monte C.: Historical notes of the Minnesota Valley Medical Association and the Southern Minnesota Medical Association, 491
Pituitary gland, A basophilic adenoma of the, 73
Plass, E. D.: Simplified obstetric care, 768
Pneumothorax, artificial, as therapeutic treatment in pulmonary tuberculosis, The safeness of, 580
Poisonings, commoner industrial, Medical aspects of the, 234.
Poisonings, commoner industrial,—lead, arsenic and carbon monoxide, The treatment of the, 236
Postoperative feeding, early, The effects of, 382
Postoperative pulmonary complications and postoperative use of the Trendelenburg position, 273
Pregnancy, Late toxemias of, 287
Preoperative, operative and postoperative technic of prostatic resection with the direct vision cold knife instrument, The, 218
Present status of clinical allergy, The, 773
Present status of our knowledge of the adrenal gland, The, 66
Prevention of whooping cough with bacillus pertussis vaccine, The, 695
Prognosis and treatment of coronary occlusion, The, 710
Prognosis in fractures of the skull, 187
Prostatic resection, The preoperative, operative and postoperative technic of, with the direct vision cold knife instrument, 218
Prostatic resection, Transurethral, 224
Pseudoxanthoma elasticum, Angioid streaks of the retina associated with, 599
Purpura, Essential thrombocytopenic, 15
Placenta previa, Roentgenologic diagnosis of, 9
Pulmonary complications, Postoperative, and postoperative use of the Trendelenburg position, 273
Pulmonary fat embolism, 636
Pyloric obstruction, Gastritis, a phenomenon of; and its relation to duodenal ulcer, 206
Pyrethrum in the treatment of scabies, 793

R

Radium treatment of nonmalignant conditions, The, 789
Radius, Fractures of the lower end of the, 78
Radius, Malunited fracture of the lower end of the, (Colles' fracture) treated by osteotomy, 84
Randall, Lawrence M., and Counseller, Virgil S.: Treatment of pelvic inflammation by heat: indications and results, 1
Rationale of the injection treatment of hernia, The, 623
Rectum and sigmoid, Electrocoagulation of carcinoma of the, 487
Reed, Charles A.: Fractures of the lower end of the radius, 78
Reflex urinary frequency (abstract), 816
Regnier, E. A.: Case report: Congenital obstruction of the third portion of the duodenum in a two year old boy. Operation with recovery, 60
Regnier, E. A.: Fractures of the neck of the femur, 185
Renal calculi, Unusually large bilateral (case report), 303
Report of three cases of diabetic gangrene, 127
Retina, Angioid streaks of the, associated with pseudoxanthoma elasticum, 599
Retina, Detachment of the (moving picture demonstration), 258
Retinal detachment, 201
Rheumatism, juvenile, Clinical studies in, 370
Rice, Carl O.: The rationale of the injection treatment of hernia, 623
Ritchie, Harry P.: Congenital clefts of the face and jaws, The (discussion), 406
Robb, E. F.: A study of the mortality of premature infants delivered by cesarean section, 590
Roentgenologic diagnosis of placenta previa, 9

S

Safeness of artificial pneumothorax as therapeutic treatment in pulmonary tuberculosis, The, 580
Sauer, Louis: The prevention of whooping cough with bacillus pertussis vaccine, 695
Scabies, Pyrethrum in the treatment of, 793
Scarlet fever, Multiple areas of cutaneous gangrene following, 154
Schons, Edward: Value of cholecystography by the oral method, with an analysis of 189 operated cases, 269
Schüller-Christian's disease or xanthomatosis—Tumors simulating carcinoma, 627
Schwartz, Virgil J.: The broken nose, 101
Schwyzer, Arnold: Late results in a case of arthroplasty of both hip joints for painful ankylosing arthritis, 553
Sclerosing agent, Sodium ricinoleate as a, 594
Sepsis, Blood transfusion in the treatment of, 30
Shaperman, E., and Stoesser, A. V.: The care of the allergic child, 292
Shapiro, Gertrude K., and Shapiro, M. J.: Clinical studies in juvenile rheumatism, 370
Shapiro, M. J., and Shapiro, Gertrude K.: Clinical studies in juvenile rheumatism, 370
Shoulder, Fracture dislocation of the, 191
Side-view sketches of physicians, 567
Sigmoid, Electrocoagulation of carcinoma of the rectum and, 487
Simplified obstetric care, 768
Sinusitis, frontal, Some observations on the intranasal operation for, 744
Skull, Prognosis in fractures of the, 187
Smith, Arthur Edward: Fundus examination in short wave-length light (abstract), 175
Sodium ricinoleate as a sclerosing agent, 594
Sohlberg, Olof I.: The effects of early postoperative feeding, 382
Some observations on the intranasal operation for frontal sinusitis, 744
Some of the newer developments in hyperthyroidism and hyperparathyroidism, 761
Southern Minnesota Medical Association, Historical notes of the Minnesota Valley Medical Association and the, 491
Spinal cord injuries (abstract), 815
Spinal cord, Intramedullary tumor of the (case report), 462
Spine, Acute fractures of the, 88
Spratt, C. N.: Detachment of the retina (moving picture demonstration), 258
Stewart, David A.: The community versus tuberculosis, 561
Stosser, A. V., and Shaperman, E.: The care of the allergic child, 292
Stomach, Carcinoma of the, 484
Stomach, The modes of onset and symptoms of carcinoma of the, 586
Study of the mortality of premature infants delivered by cesarean section, 590
Study of tuberculosis in families, A, 276
Subastragaloid and triple arthrodesis, 260
Suicide, Attempted, 148
Supracondylar fractures of the elbow and their complications, 597
Suprarenal cortical hormone, 71
Surgery of hyperinsulinism, The, 265
Sweetser, Theodore H.: Case report: Horseshoe kidney with complication, 61
Sweetser, Theodore H.: Malignant tumors of the urinary tract, 416
Sweetser, Theodore H.: Management of kidney injuries, 283
Sweitzer, S. E., and Laymon, Carl W.: Multiple areas of cutaneous gangrene following scarlet fever, 154
Sweitzer, S. E., and Tedder, J. W.: Pyrethrum in the treatment of scabies, 793

Societies

American Association for the Study of Goiter, 315
American Association of Mental Deficiency, 254
American College of Surgeons, North Central Section, 172, 317
American Congress of Physical Therapy, 129
American Neisserian Medical Society, 172
American Urological Association, 315
Blue Earth Valley Medical Society, 48
Clay-Becker County Medical Society, 48
College of Surgeons sectional meeting, 128
Duluth Surgical Society, 812
Great Northern Railway Surgeons' Association, 404
Interchange lectures at Rochester, 129
International Association for Dental Research, 173
Jackson, Clarence Martin, lectureship, 128
Kandiyohi—Swift—Meeker County Society, 173, 255
Mayo Foundation lectures, 129
Medical broadcast, 48, 128, 172, 254, 315, 404, 558, 684, 759, 812
Minneapolis Surgical Society, 48, 255, 316
Minneapolis Surgical Society, Transactions of, 52, 123, 183, 259, 319, 409, 481, 613
  Cancer symposium, 409 and 481
  Fracture symposium, 183
Minnesota Academy of Medicine, Proceedings, 50, 406, 475, 552, 813
Minnesota Dermatological Society, 255
Minnesota Radiological Society, 129, 316, 558
Minnesota Society of Internal Medicine, 316, 812
Minnesota State Board of Medical Examiners, 473
Minnesota State Medical Association, 173, 254, 315, 399, 473, 558, 685, 759
  Proceedings, House of Delegates, 685
  Program, 399
Mississippi Valley Medical Society, 404, 473
Nicollet-LeSueur County Medical Society, 173, 316
Northern Minnesota Medical Association, 317, 474, 558, 684

Range Medical Society, 474
Red River Valley Medical Society, 48, 812
Redwood-Brown County Medical Society, 405, 474
Renville County Medical Society, 812
Rice County Medical Society, 255, 405, 759
St. Louis County Medical Society, 405
Saint Paul Surgical Society, 812
Scott-Carver County Medical Society, 405, 558, 684
Sixth Councilor District meeting, 759
Southeastern Surgical Congress, 48
Southern Minnesota Medical Association, 474, 558
Stearns-Benton County Medical Society, 174, 255
Union Hospital staff meeting, 129, 174
University extension course in refraction, 684
Upper Mississippi Medical Society, 174, 405, 759
Wabasha County Medical Society, 559
Wabasha and Winona County Medical Societies, 255
Washington County Medical Society, 48, 405
Woman's Auxiliary, 49, 129, 174, 267, 318, 408, 760, 812

T

Ten years of surgery for cancer of the breast, 131
Tetanus, 613
Thomas, Gilbert J.: The preoperative, operative and postoperative technic of prostatic resection with the direct vision cold knife instrument, 218
Thompson, Gershom J.: Transurethral prostatic resection, 224
Thoracoplasty, Variations in the technic of, 262
Thyroidectomy, Total, for heart disease, 421
Thyroid gland, Malignant tumors of the, 412
Tibia and fibula, Fractures of the shaft of the, 94
Tibia, Fractures of the upper end of the, involving the knee joint, 186
Tic douloureux, The palliative treatment of, 229
Total thyroidectomy for heart disease, 421
Toxemias, Late, of pregnancy, 287
Transurethral prostatic resection, 224
Traumatic arteriovenous aneurysm of right superficial temporal artery and vein (case report), 158
Treatment of cardiac emergencies, 455
Treatment of fractures of the lower end of the humerus, The, 192
Treatment of fractures of the os calcis, 183
Treatment of fresh fractures of the hip, 91
Treatment of head injuries, 521
Treatment of non-union fracture of the hip, The, 93
Treatment of pelvic inflammation by heat: indications and results, 1
Treatment of severe essential hypertension, The, 134
Treatment of some types of arteriovenous aneurysms and cavernous hemangiomas, 260
Treatment of the commoner industrial poisonings—lead, arsenic and carbon monoxide, 236
Trendelenburg position, Postoperative pulmonary complications and postoperative use of the, 273
Tuberculosis, Clinical, among employes of local institutions caring for tuberculosis patients, 452
Tuberculosis in families, A study of, 276
Tuberculosis, pulmonary, The safeness of artificial pneumothorax as therapeutic treatment in, 580
Tuberculosis, The community versus, 561
Tuberculous infection, Factors contributing to the further reduction of, 280
Tumor, Intramedullary, of the spinal cord (case report), 462
Tumors simulating carcinoma—Schüller-Christian's disease or xanthomatosis, 627
Tuohy, E. L.: The management of essential hypertension, 354

U

Ude, Walter H., and Urner, John A.: Roentgenologic diagnosis of placenta previa, 9
Ulcer, duodenal, Gastritis, a phenomenon of pyloric obstruction and its relation to, 206
Ulcer, duodenal, The evaluation of the treatment of, 554
Ulcer, peptic, The history of the development of surgery for, 351
Ulrich, Henry L.: A basophilic adenoma of the pituitary gland, 73
Unusually large bilateral renal calculi (case report), 303
Unusual pharyngo-esophageal foreign body and its removal (case report), 304
Urinary frequency, Reflex (abstract), 816
Urinary tract, Malignant tumors of the, 416
Urner, John A., and Ude, Walter H.: Roentgenologic diagnosis of placenta previa, 9
Use of living sutures in the repair of abdominal hernias, The, 365

V

Value of cholecystography by the oral method, with an analysis of 189 operated cases, 269
Variations in the technic of thoracoplasty, 262
Varicose veins, The ambulant treatment of, by ligation, division and injection of the distal segment, 592
Verruca senilis and keratoma senile, 735
Vertebræ, Fractured, 189
Vinson, Porter P., and Weber, Harry M.: The localization of bones in the esophagus by roentgenoscopy (case report), 240
Visualization of the biliary tract by injection of radio-opaque media postoperatively, 259

W

Walters, Waltman, and Church, Gerald T.: Gastritis, a phenomenon of pyloric obstruction and its relation to duodenal ulcer, 206
Walters, Waltman, and Olson, Paul F.: Papillary colloid adenocarcinoma of the extrahepatic bile ducts (case report), 460.
Wangensteen, Owen H.: Non-operative treatment of localized perforations of the duodenum (abstract), 477
Wangensteen, Owen H.: The surgery of hyperinsulinism, 265
Webb, R. C.: Fractures of the upper end of the tibia involving the knee joint, 186
Webb, Roscoe C.: Hyperparathyroidism, 664
Weber, Harry M., and Vinson, Porter P.: The localization of bones in the esophagus by roentgenoscopy (case report), 240
White, W. D., Fractured vertebræ, 189
Whooping cough, The prevention of, with bacillus pertussis vaccine, 695
Wilbur, Dwight L.: The modes of onset and symptoms of carcinoma of the stomach, 586
Wilcox, Archa E.: Sideview sketches of physicians, 567
Williams, Henry L., and Lillie, Harold I.: The external fronto-ethmo-sphenoid operation, 786
Williamson, George A., and Cole, Wallace H.: Fractures of carpal navicular bone, 81
Willius, Frederick A.: Electrocardiography as a diagnostic adjunct in the anginal syndrome of coronary sclerosis, 20
Wright, F. R.: Reflex urinary frequency (abstract), 816
Wright, Harold N.: The treatment of the commoner industrial poisonings—lead, arsenic and carbon monoxide, 236
Wynne, H. M. N.: Menopausal and post-menopausal bleeding, 12

X

Xanthomatosis, Schüller-Christian's disease or, Tumors simulating carcinoma, 627

Z

Zierold, Arthur A.: Prognosis in fractures of the skull, 187

DATE DUE SLIP
UNIVERSITY OF CALIFORNIA MEDICAL SCHOOL LIBRARY

THIS BOOK IS DUE ON THE LAST DATE
STAMPED BELOW

MAY 1 5 1936
SEP 2 1936
DEC 1 1936
MAR 2 1937
OCT 25 1937
MAY 14 1938
NOV 1941
JUN 9 1943
DEC 8 - 1943
AUG 1945
Apr 10 50
~~MAR 8 1955~~
14

7 DAY
MAY 20 1958
7 DAY
NOV 19 1974
RETURNED
NOV 25 1974
27

3m-10,'34

v.20 Minnesota medicine
1937

Kilgore Lechner	AUG 10 1938	AUG 2 1938 43/32
D. Burns	NOV 1 1938	OCT 20 1938
H Evans	FEB 1	FEB 2
P. T. Burton	APR 13 1939	
A. Franz	APR 29 1939	APR 25 1939
	MAY 12 1939	
[illegible]	JAN 22 1940	
[illegible]	JAN 22	
Morgan	Jan 19'40	
	JUL 9	
A M Foley	AUG	
[illegible]		
E Burt.		
S.S.F.H		

OL LIBRARY